

# KIC 003323887

## Q1-17 DR25 TCE Parameters

TCE	Run Type	KOI?	Period (Days)	Epoch (BKJD)	Depth (ppm)	Duration (Hours)	MES	SNR	$R_{\star}$ ( $R_{\odot}$ )	$T_{\star}$ (K)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
003323887-01	OBS	No	19.222229	145.864428	5737.6	3.084	166.3	214.7	0.96	5779	8.07	45.31
003323887-02	OBS	0377.01	19.276130	143.884976	304.7	5.345	135.7	14.9	0.96	5779	2.01	45.14
003323887-03	OBS	No	39.065814	132.509654	345.1	5.247	100.7	12.3	0.96	5779	2.31	17.60
003323887-04	OBS	No	38.810860	137.239202	3974.5	4.500	84.2	-1.0	0.96	5779	5.96	17.76

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
003323887-01	OBS	FP	0.00	1	0	1	0	LPP_DV—HALO_GHOST
003323887-02	OBS	FP	0.00	1	0	0	0	LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
003323887-03	OBS	FP	0.01	1	0	0	0	MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
003323887-04	OBS	FP	0.00	1	0	1	0	LPP_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—CENT_NOFITS—HALO_GHOST

**Notes:** OBS = Observed. INJ = Injected. INV = Inverted. SCR = Scrambled.

N = Not Transit-Like. S = Stellar Eclipse. C = Centroid Offset. E = Ephemeris Match.

See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

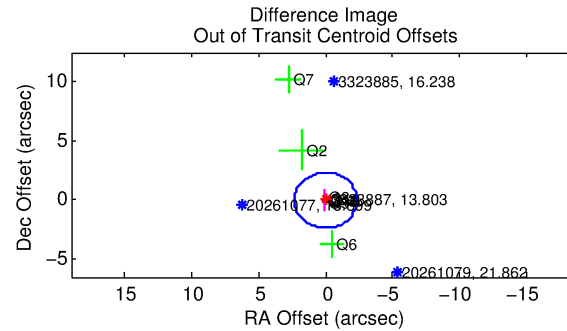
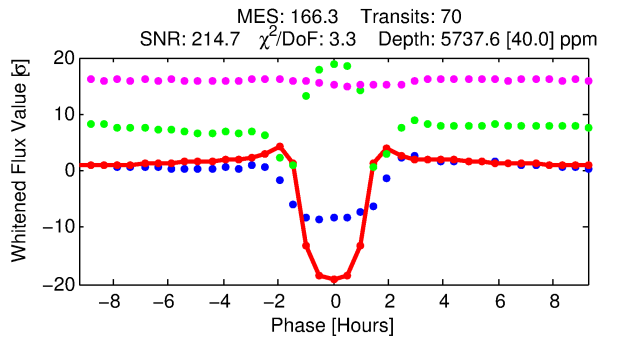
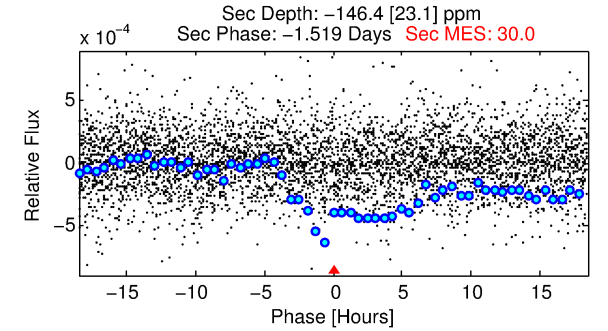
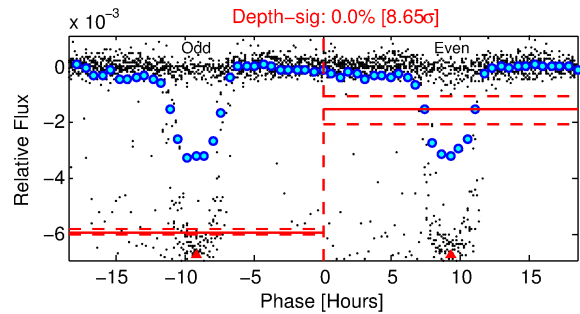
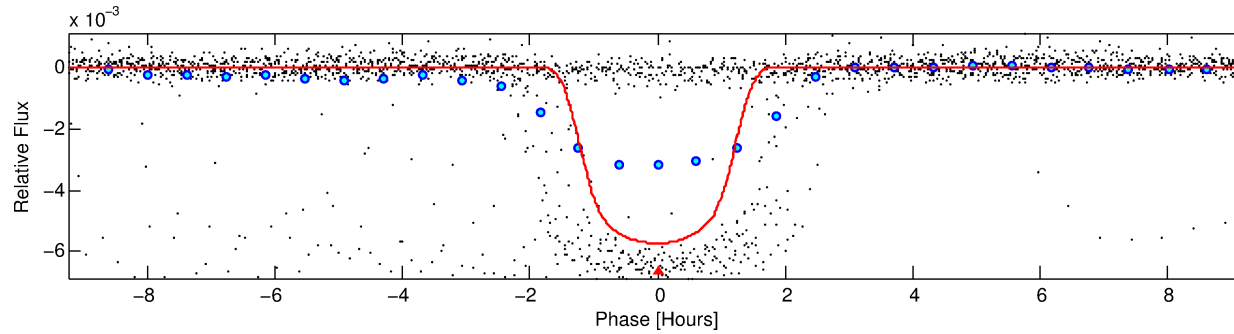
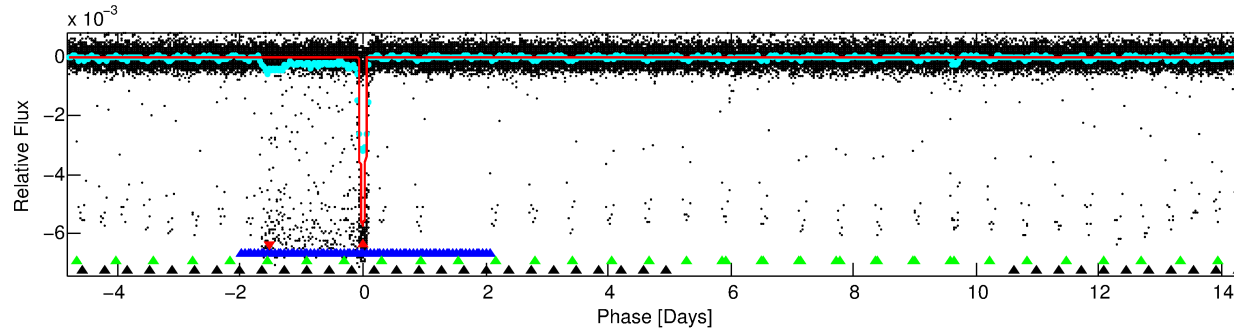
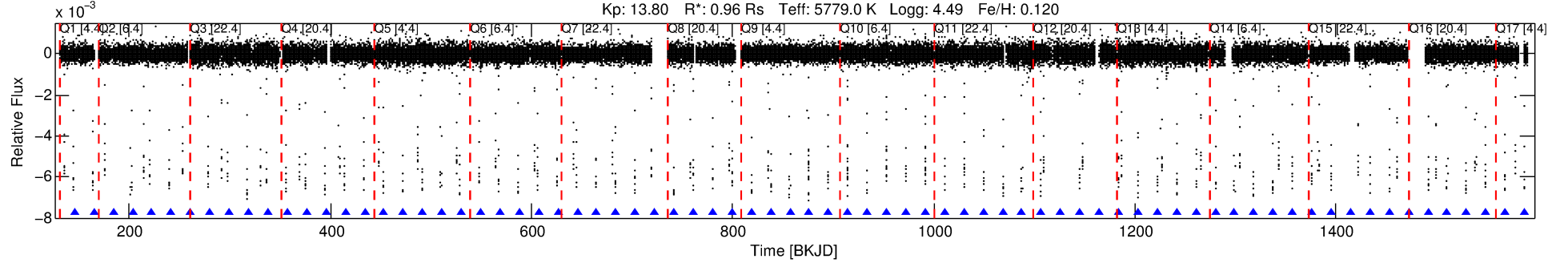
Ephemeris Match Information For 003323887-01

No Significant Match Found

# DV One-Page Summary

KIC: 3323887 Candidate: 1 of 4 Period: 19.222 d  
KOI: K00377 Name: Kepler-9 Corr: No Ephemeris Match

Kp: 13.80 R\*: 0.96 Rs Teff: 5779.0 K Logg: 4.49 Fe/H: 0.120



DV Fit Results:

Period = 19.22223 [0.00001] d  
Epoch = 145.8644 [0.0004] BKJD  
Rp/R\* = 0.0774 [0.0008]  
a/R\* = 34.32 [1.20]  
b = 0.80 [0.02]  
Seff = 45.31 [10.80]  
Teq = 662 [39] K  
Rp = 8.07 [1.24] Re  
a = 0.1420 [0.0202] AU  
Ag = N/A  
Teffp = N/A

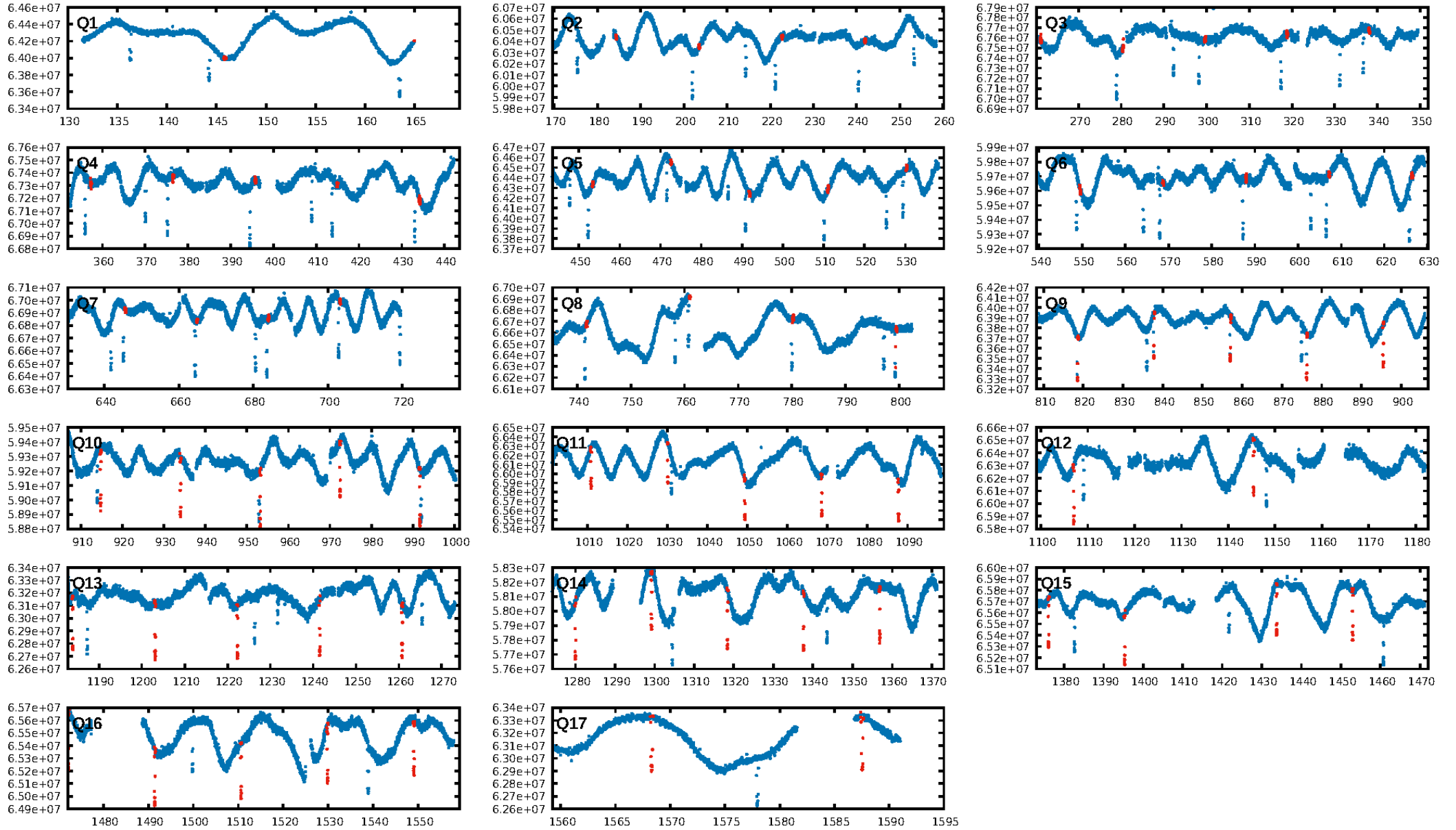
DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 16.6% [0.21σ]  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGof-sig: 0.0%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [67/67]  
GhostDiagnostic-chr: 0.07863  
Centroid-sig: 0.0%  
Centroid-so: 0.353 arcsec [11.39σ]  
OotOffset-rm: 0.020 arcsec [0.03σ]  
KicOffset-rm: 0.153 arcsec [0.21σ]  
OotOffset-st: 4/3/3/3 [13]  
KicOffset-st: 4/3/3/3 [13]  
DiffImageQuality-fgm: 0.69 [9/13]  
DiffImageOverlap-fno: 0.82 [14/17]

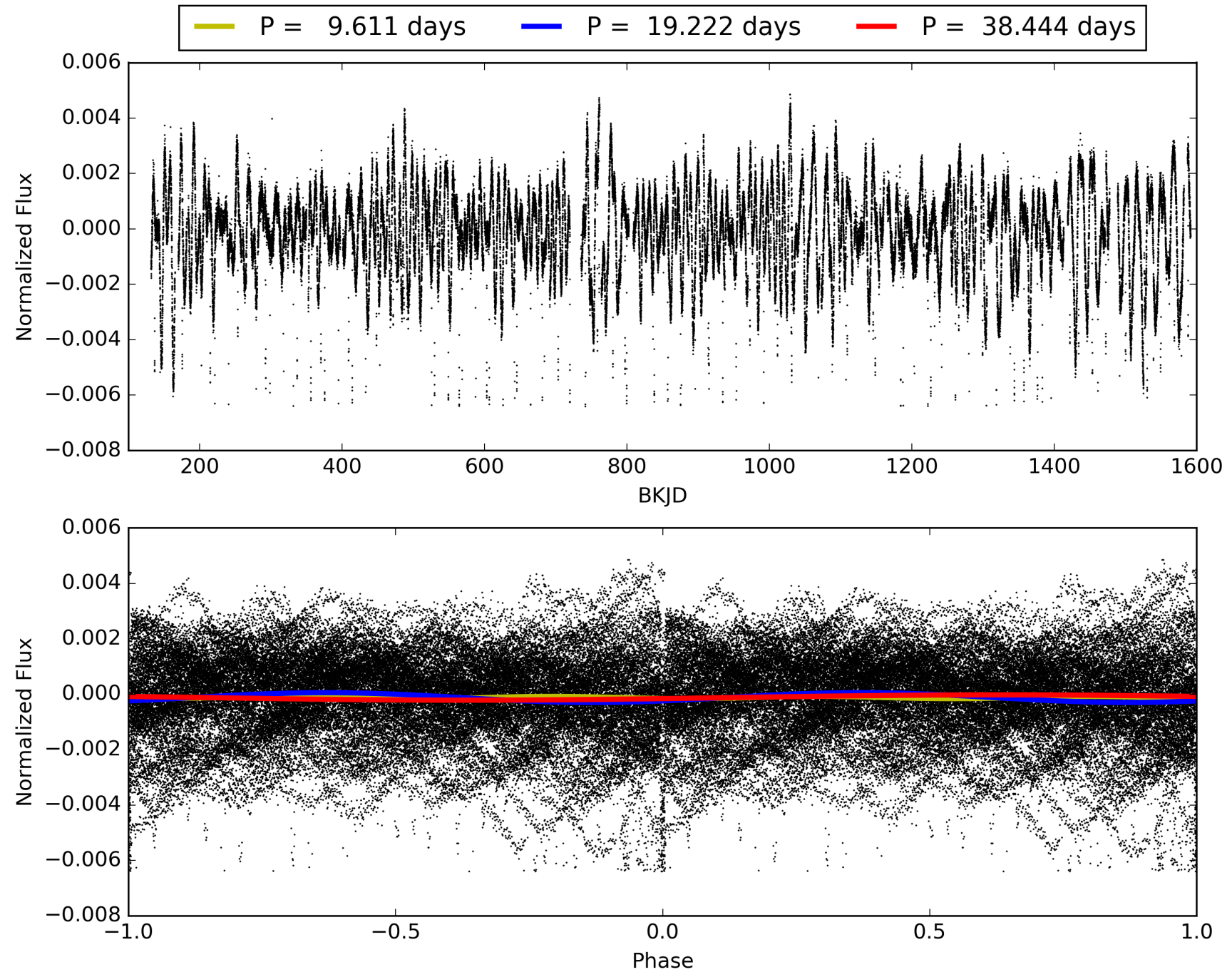
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 02-Feb-2016 07:24:05 Z

This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 00323887-01, PDC Light Curves



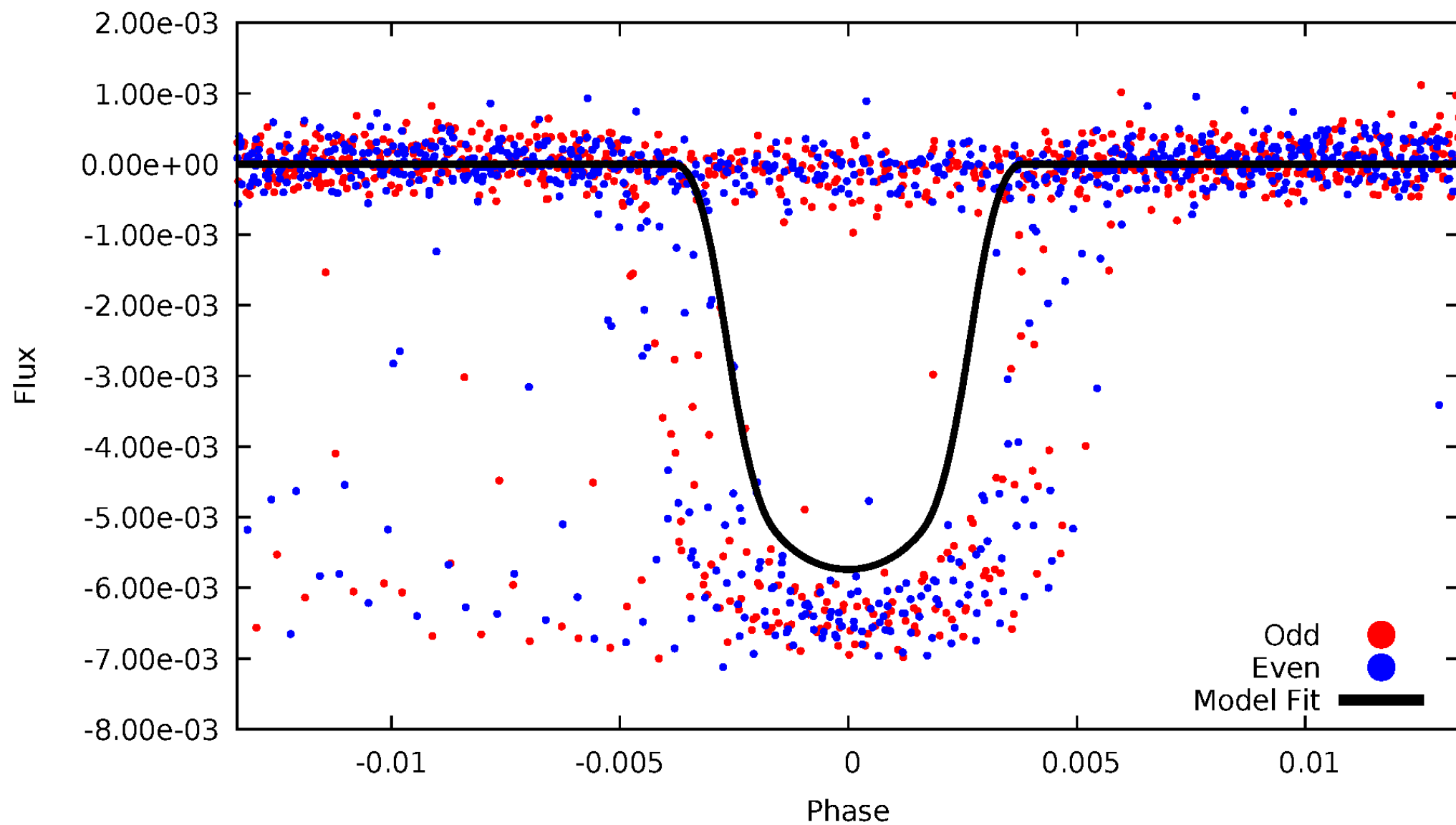
TCE 003323887-01





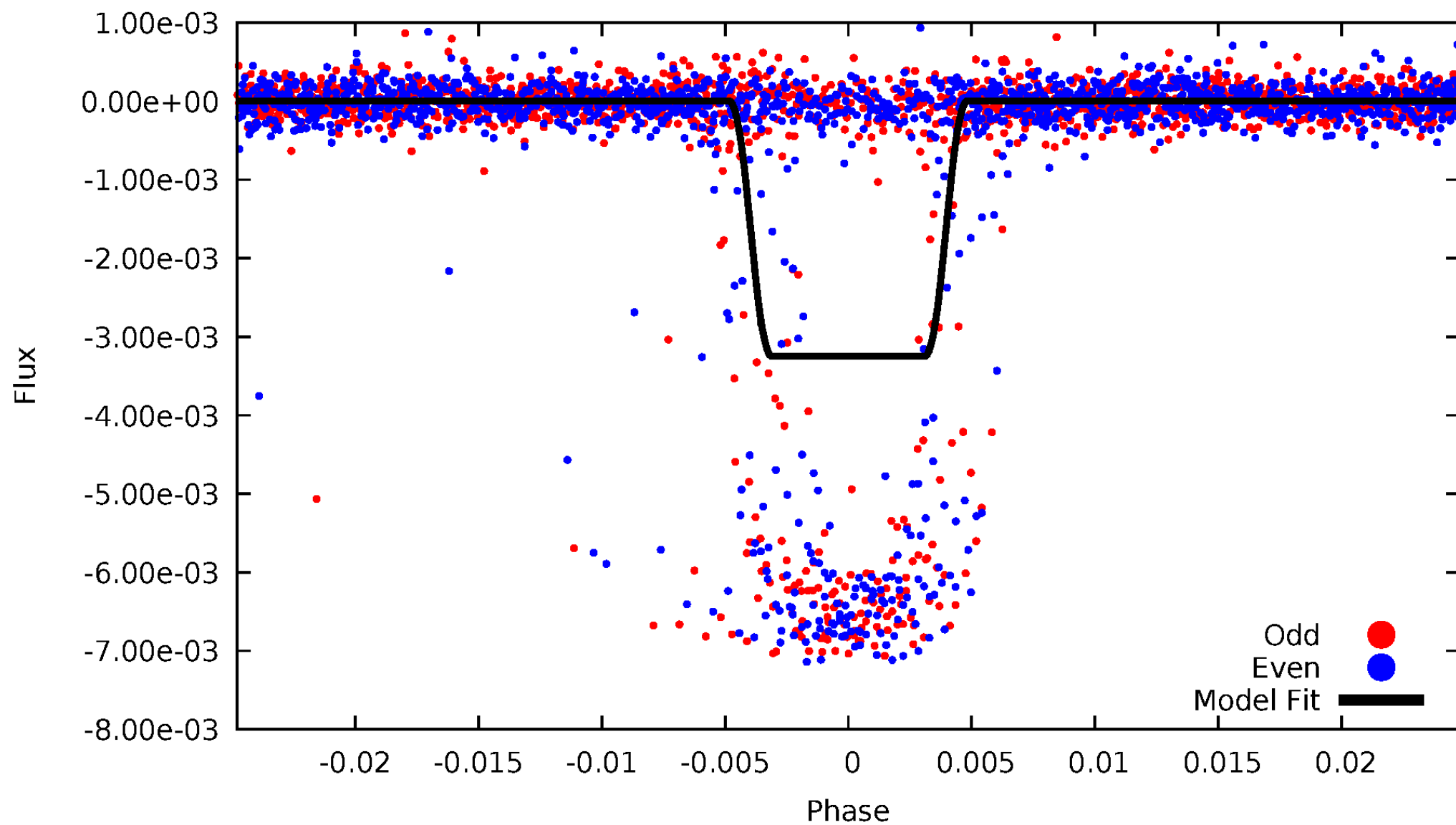
# DV Odd/Even

TCE 003323887-01



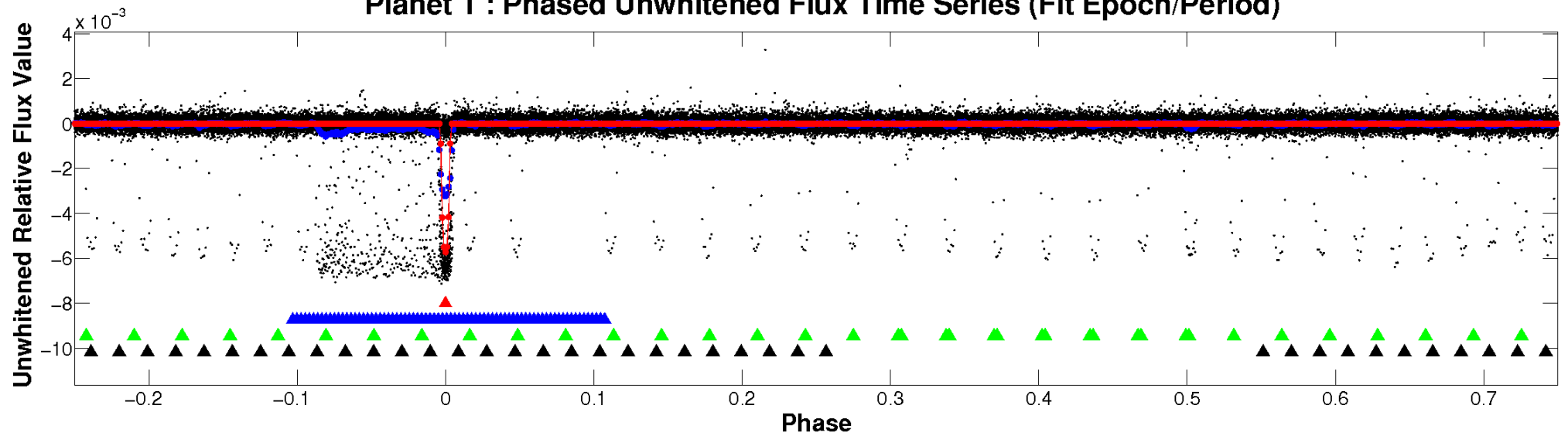
# ALT Odd/Even

TCE 003323887-01

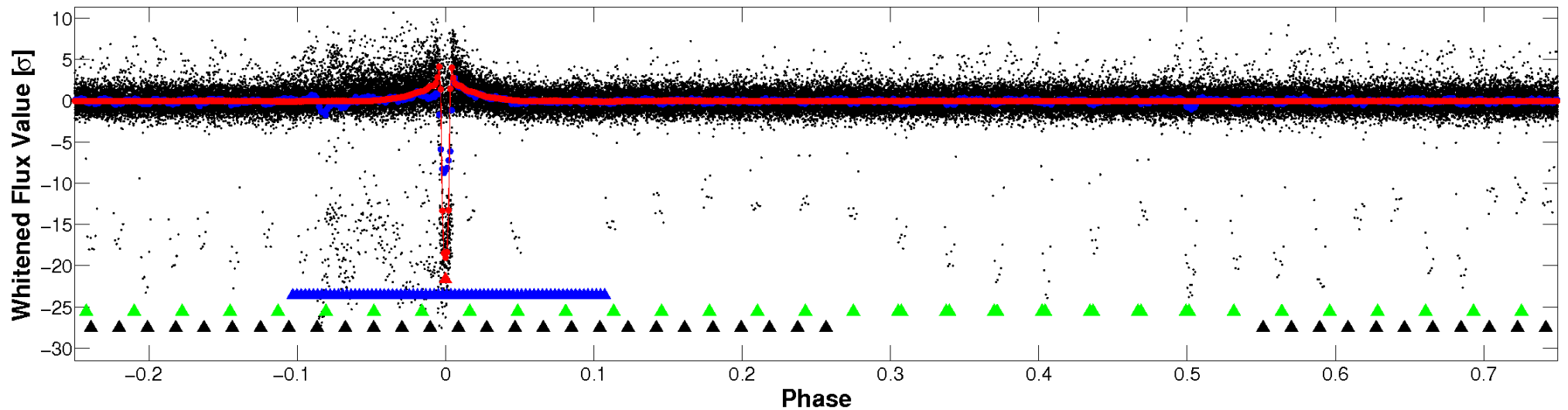


# Non-Whitened Vs. Whitened Light Curve

## Planet 1 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)

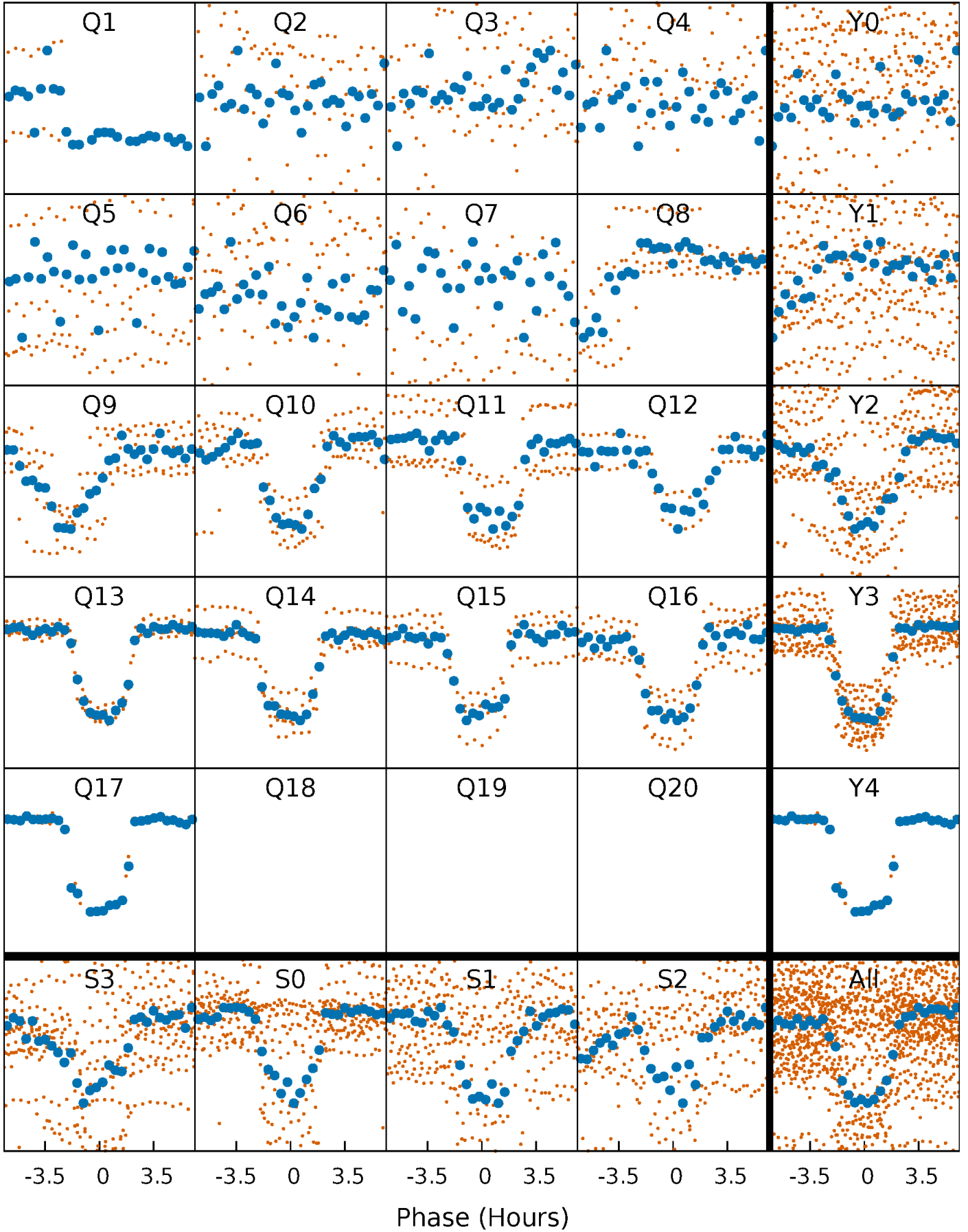


## Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



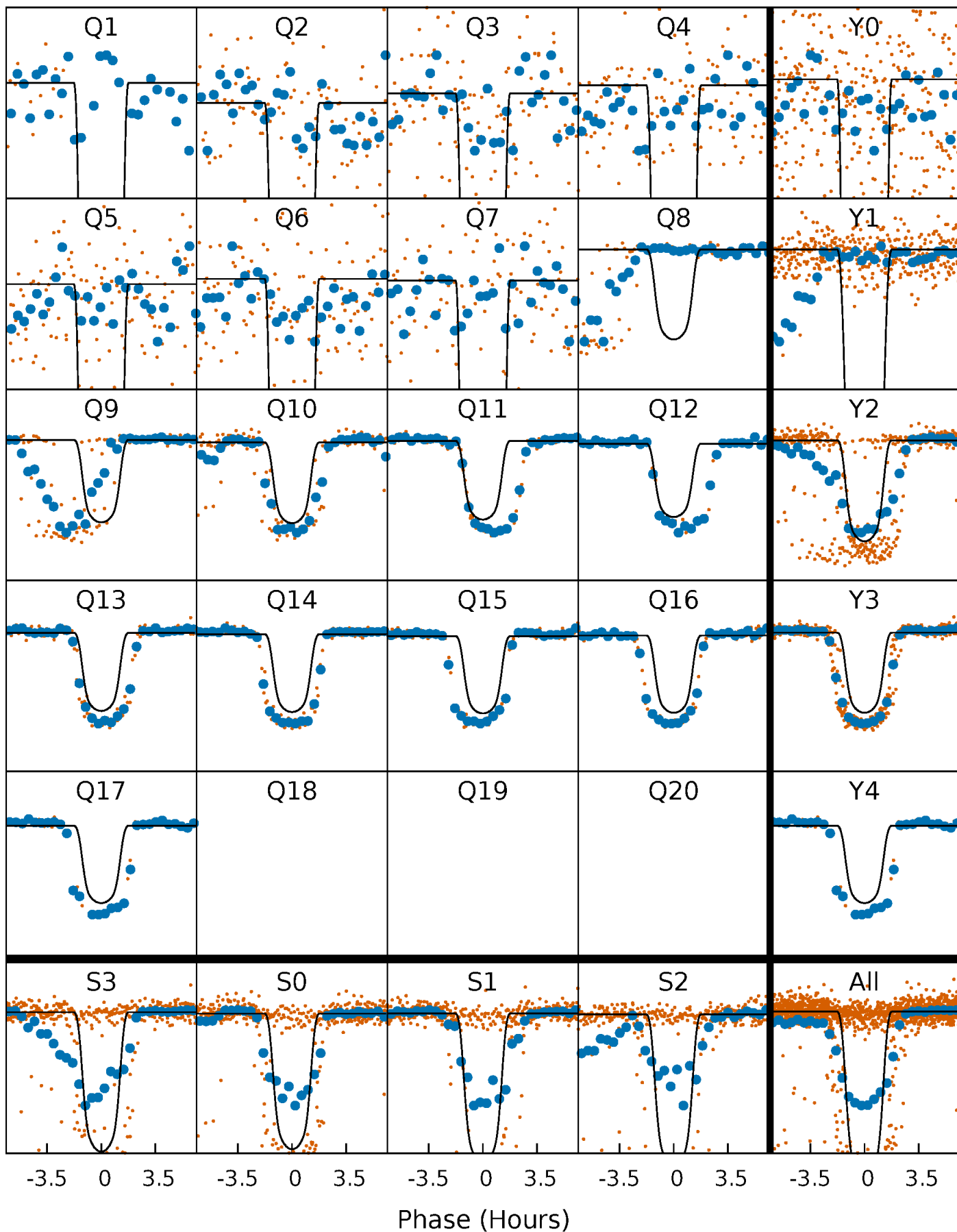
# PDC Quarter-Phased Transit Curves

TCE 003323887-01 P= 19.222229 Days  $T_0=145.864428$  (BKJD)



# DV Quarter-Phased Transit Curves

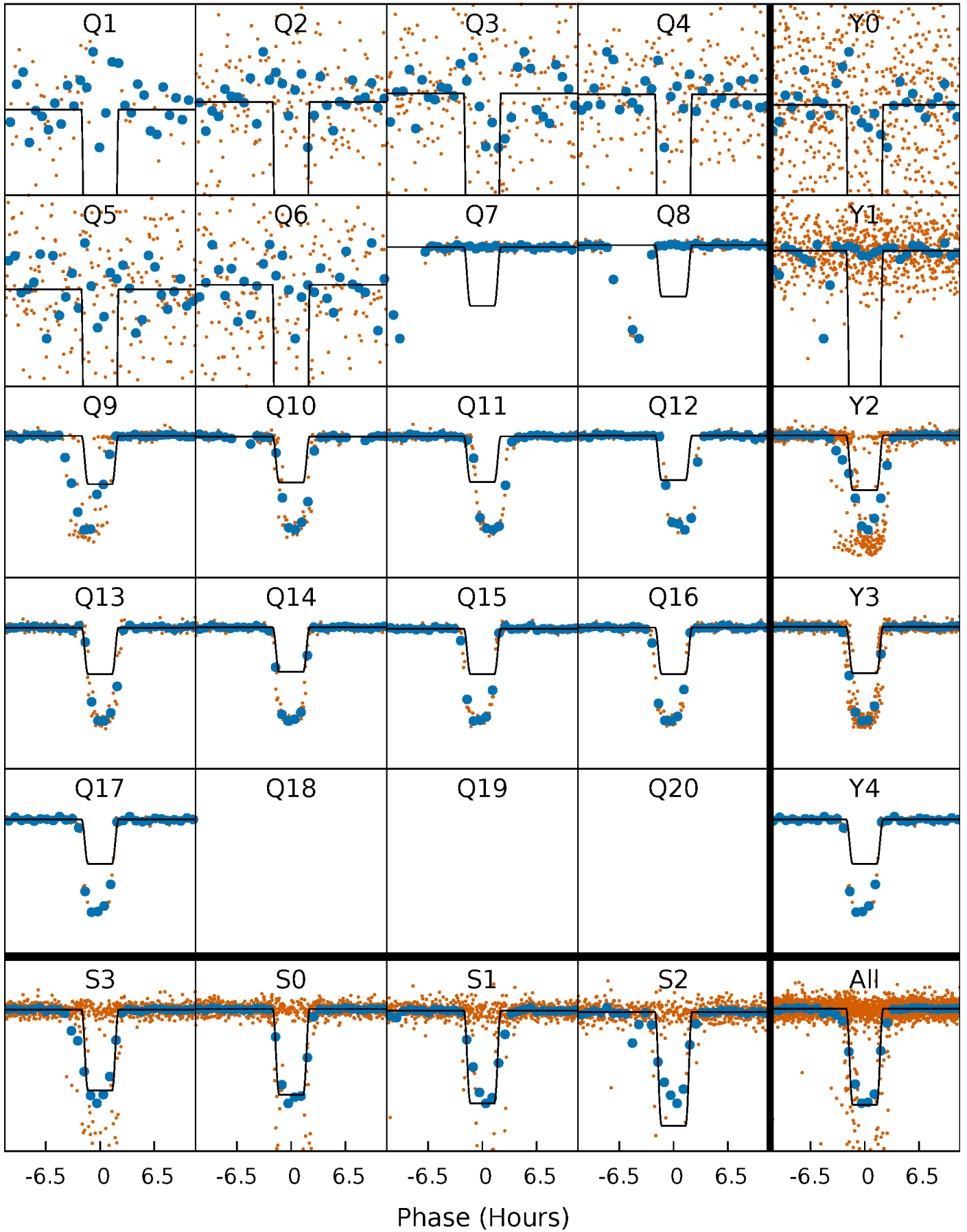
TCE 003323887-01 P= 19.222229 Days  $T_0=145.864428$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

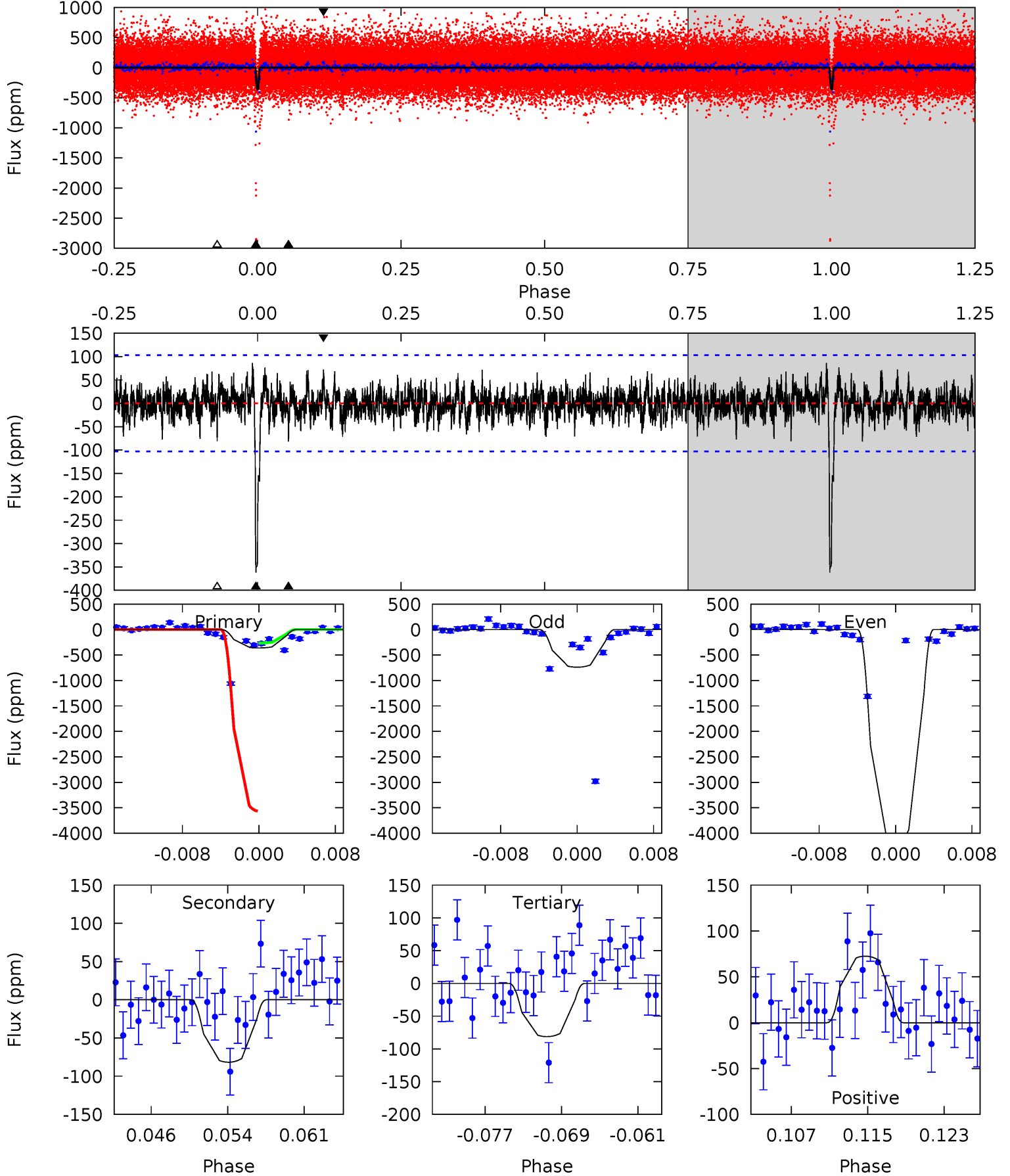
TCE 003323887-01 P= 19.223115 Days  $T_0=145.810582$  (BKJD)



# DV Model-Shift Uniqueness Test

003323887-01, P = 19.222229 Days, E = 126.642199 Days

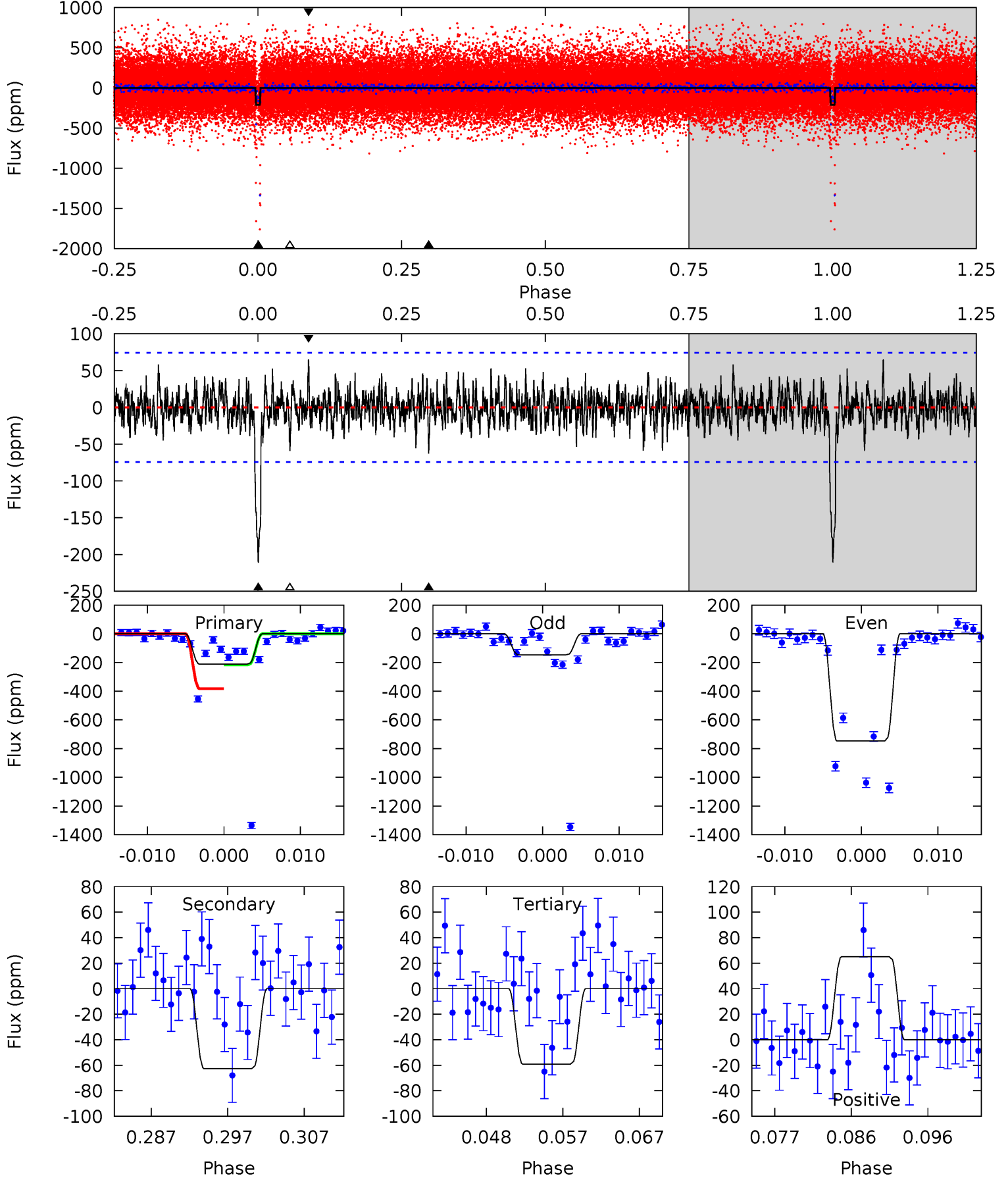
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
17.8	4.03	4.01	3.58	5.08	2.67	1.10	13.8	14.3	0.02	0.45	90.6	1.77	0.19	0



# Alt Model-Shift Uniqueness Test

003323887-01, P = 19.223115 Days, E = 126.587467 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
14.3	4.24	4.01	4.41	5.03	2.59	1.19	10.3	9.89	0.24	-0.16	20.9	1.03	0.24	5.51



### Stellar Parameters For KIC 003323887

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (g \cdot \text{cm}^{-3})$
	$5779^{+104}_{-127}$	$4.491^{+0.030}_{-0.128}$	$0.120^{+0.150}_{-0.150}$	$0.956^{+0.147}_{-0.053}$	$1.034^{+0.058}_{-0.080}$	$1.665^{+0.245}_{-0.561}$
	+2%/-2%	+1%/-3%	+125%/-125%	+15%/-6%	+6%/-8%	+15%/-34%
Source	SPE24	SPE24	SPE24	DSEP		

KIC = Kepler Input Catalog; PHO = Photometry; SPE = Spectroscopy; AST = Asteroseismology  
 TRA = Transits; DESP = Dartmouth Models; MULT = Multiple Models

### Secondary Eclipse Parameters for KIC 003323887-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-82 \pm 20$	$8.18^{+0.71}_{-0.35}$	$935^{+35}_{-28}$	$2731^{+89}_{-108}$	$13^{+4}_{-3}$
Alt.	$-63 \pm 15$	$6.08^{+0.56}_{-0.32}$	$936^{+42}_{-28}$	$2862^{+90}_{-118}$	$18^{+5}_{-5}$

$T_{max}$  = Theoretical Maximum Planetary Temperature

$T_{obs}$  = Observed Planetary Temperature (Assuming A=0.3)

$A_{obs}$  = Observed Albedo (Assuming T=0)

If a secondary eclipse is present, the system is likely an EB if  $T_{obs} \gg T_{max}$  AND  $A_{obs} \gg 1.0$

## DV Centroid Data

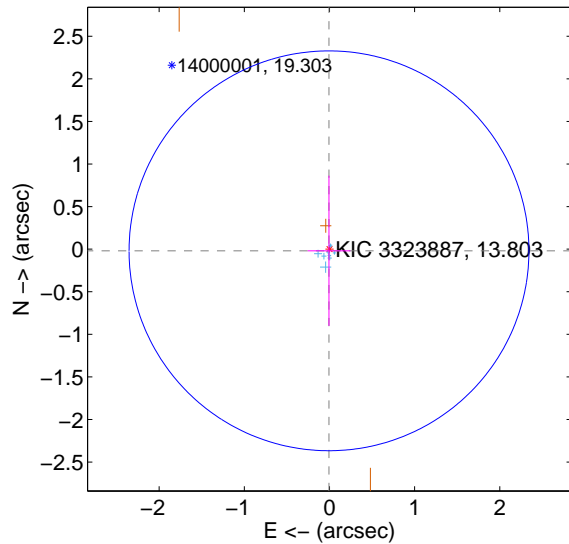
Supplemental centroid analysis for 003323887-01. Kepler magnitude: 13.80. Transit SNR 214.73

There are 9 quarters with good PRF difference image offsets

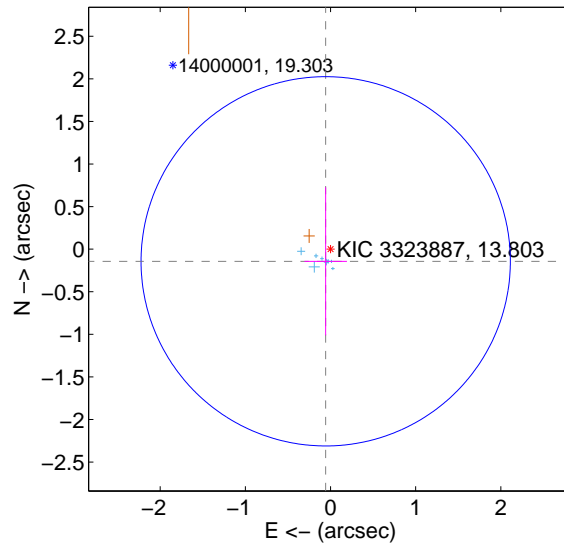
The direct PRF centroid is offset from the target star catalog position by about 0.21 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.020 \pm 0.782$	0.03	$0.006 \pm 0.250$	$-0.019 \pm 0.881$
PRF-fit source offset from KIC position	$0.153 \pm 0.723$	0.21	$0.056 \pm 0.249$	$-0.143 \pm 0.870$
photometric centroid source offset	$0.35 \pm 0.03$	11.39	$-0.02 \pm 0.03$	$-0.35 \pm 0.03$

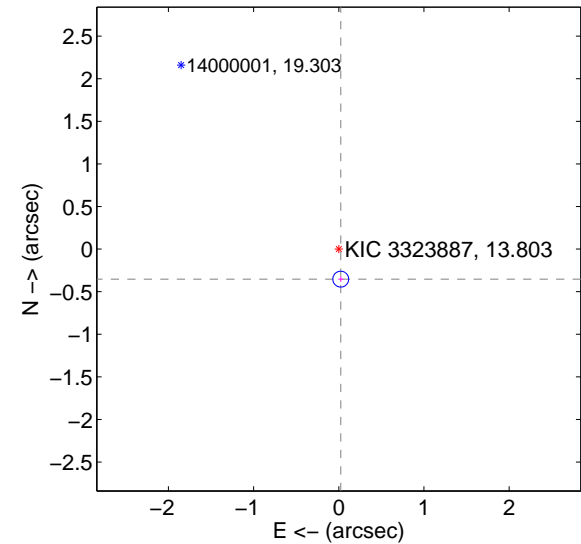
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position



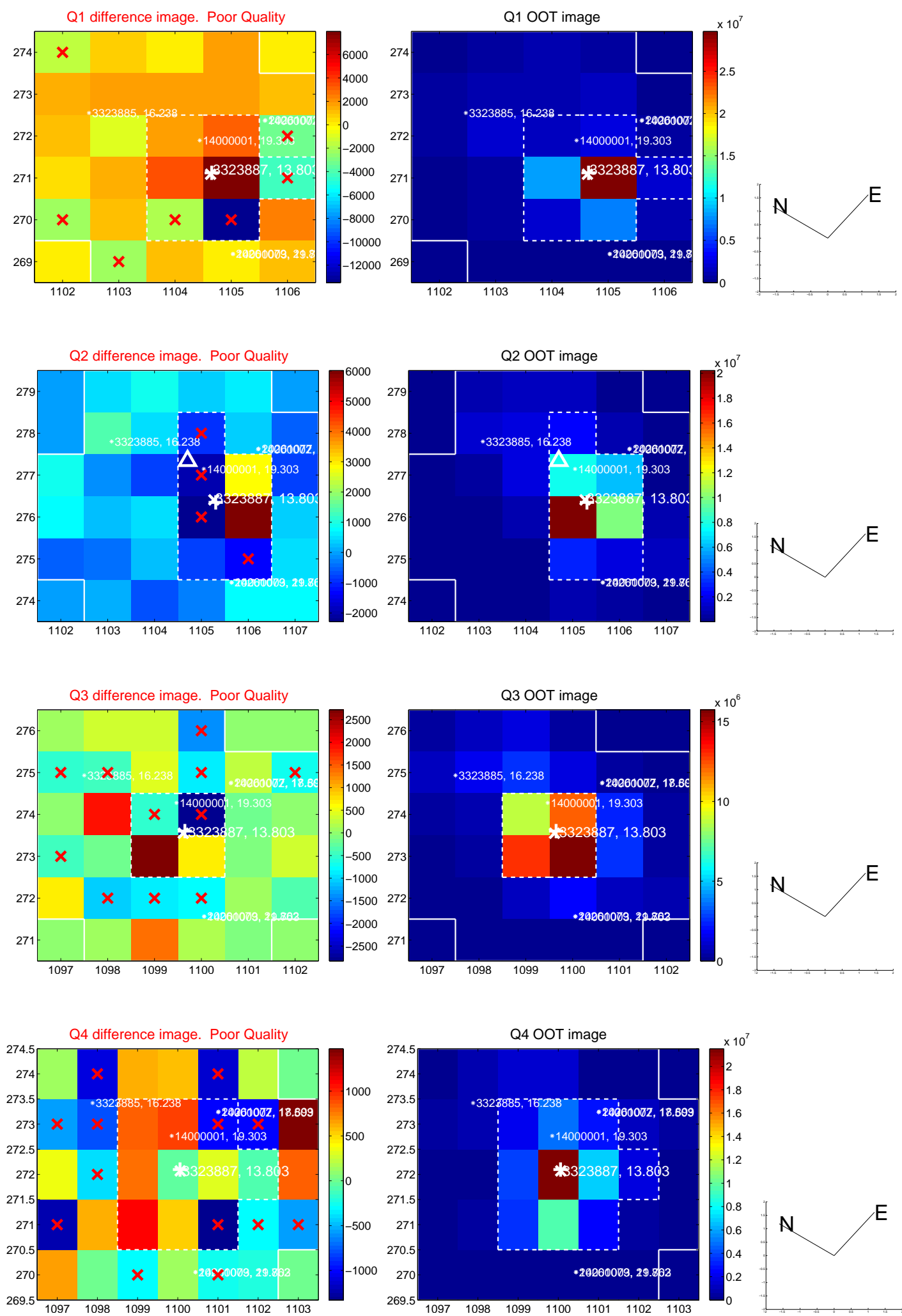
offset from photometric centroids



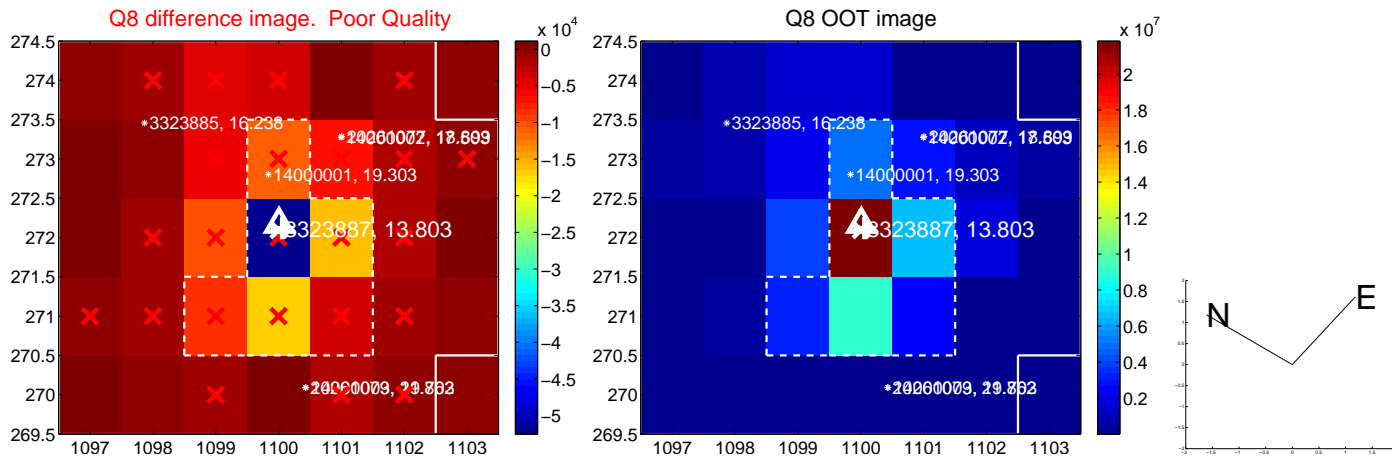
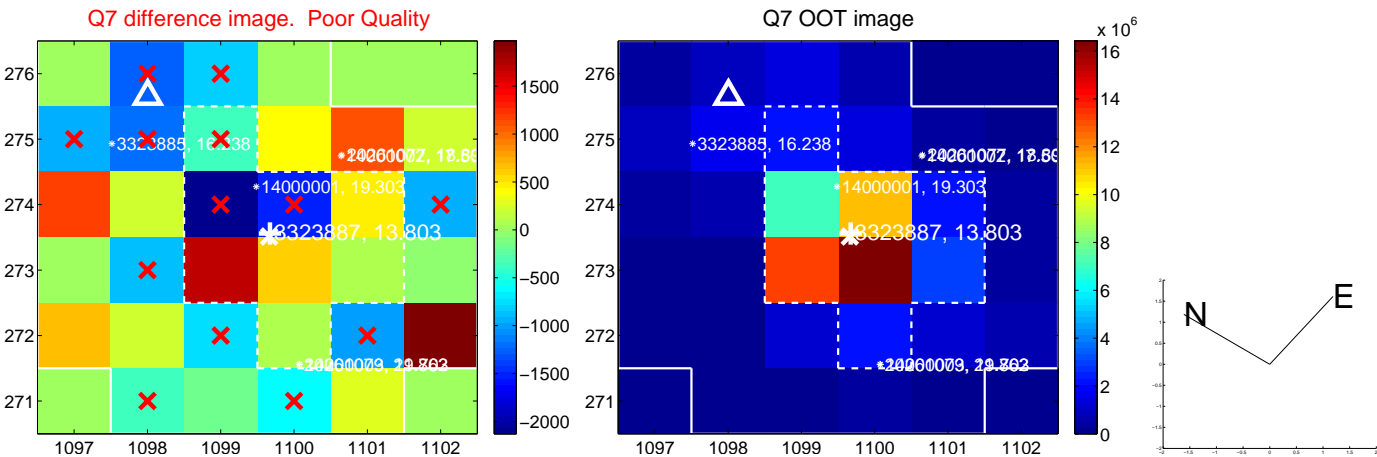
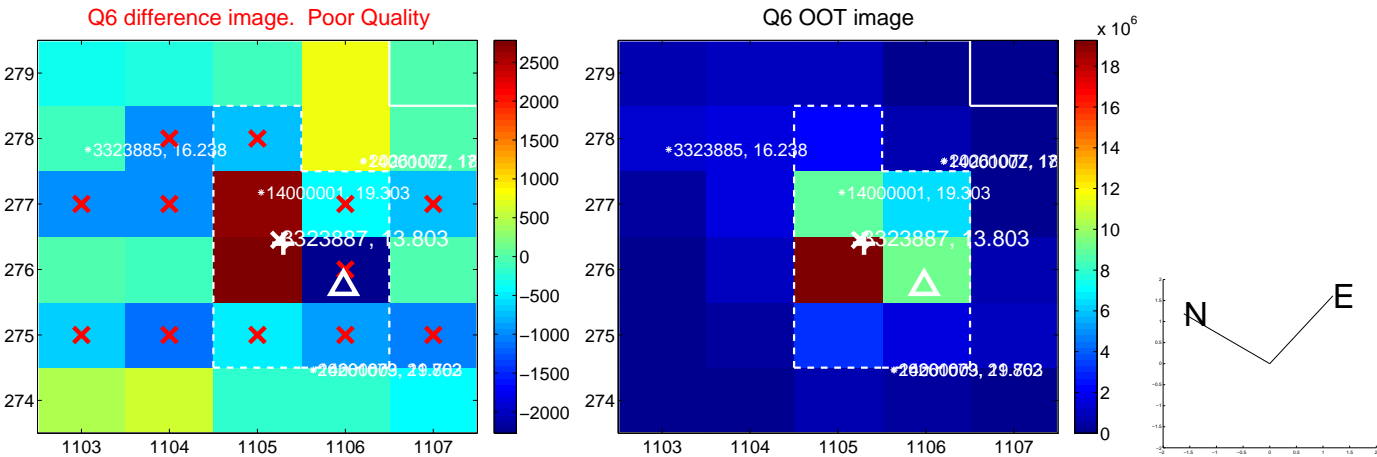
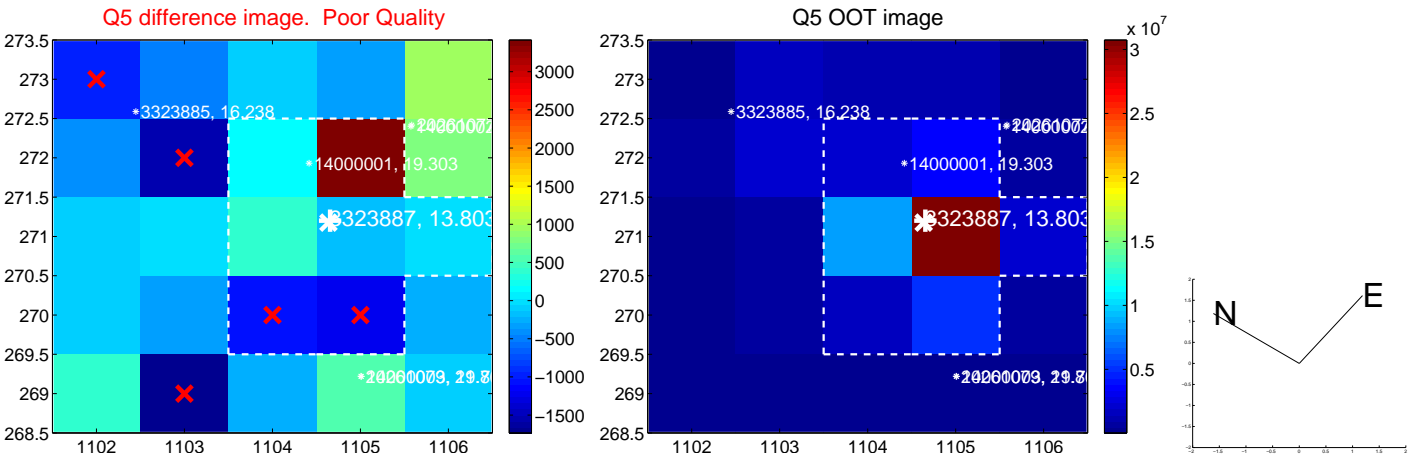
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets**; **Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three- $\sigma$ . Red \*: target star. Blue \*: Other stars. Text next to a star gives its KIC ID and kepmag. KIC IDs > 15,000,000 are from the UKIRT catalog.



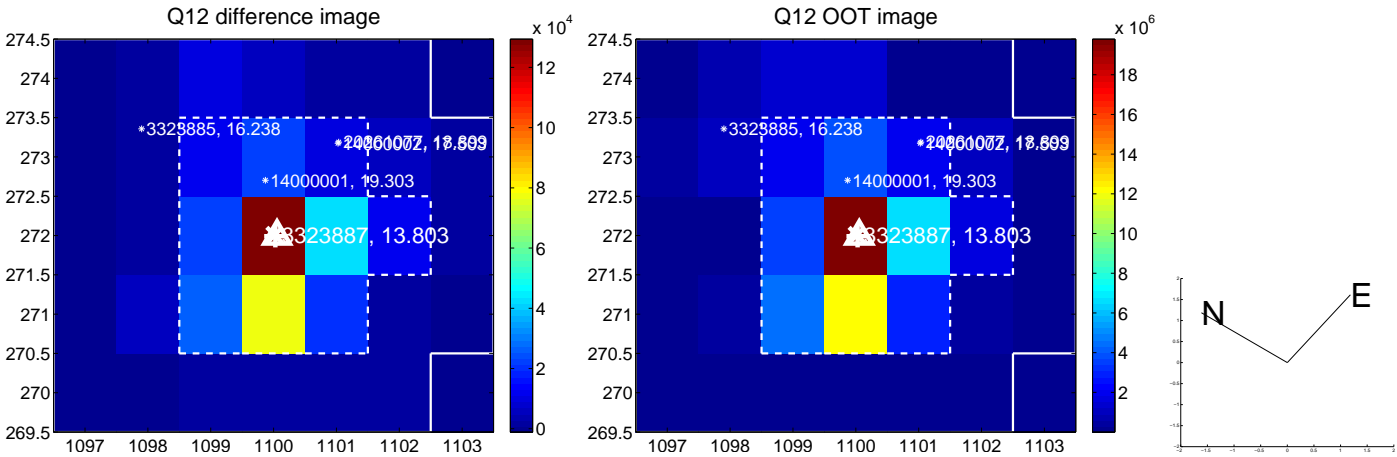
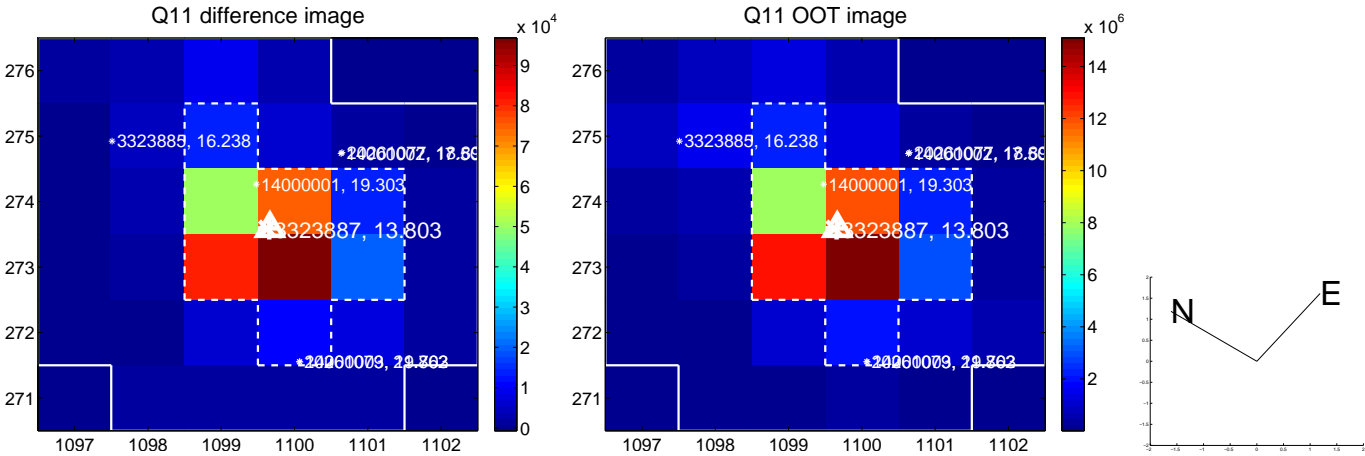
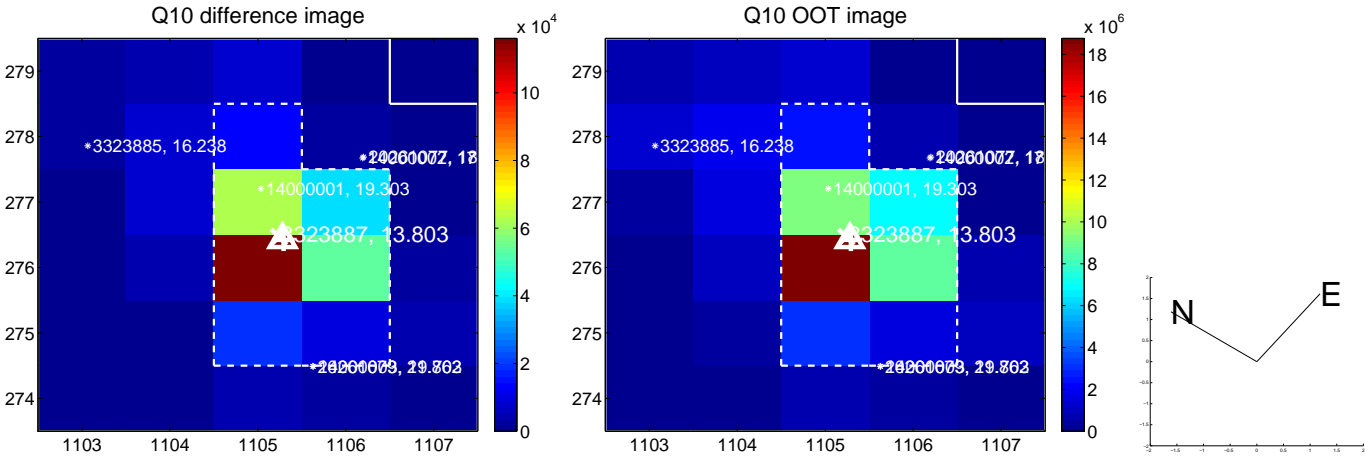
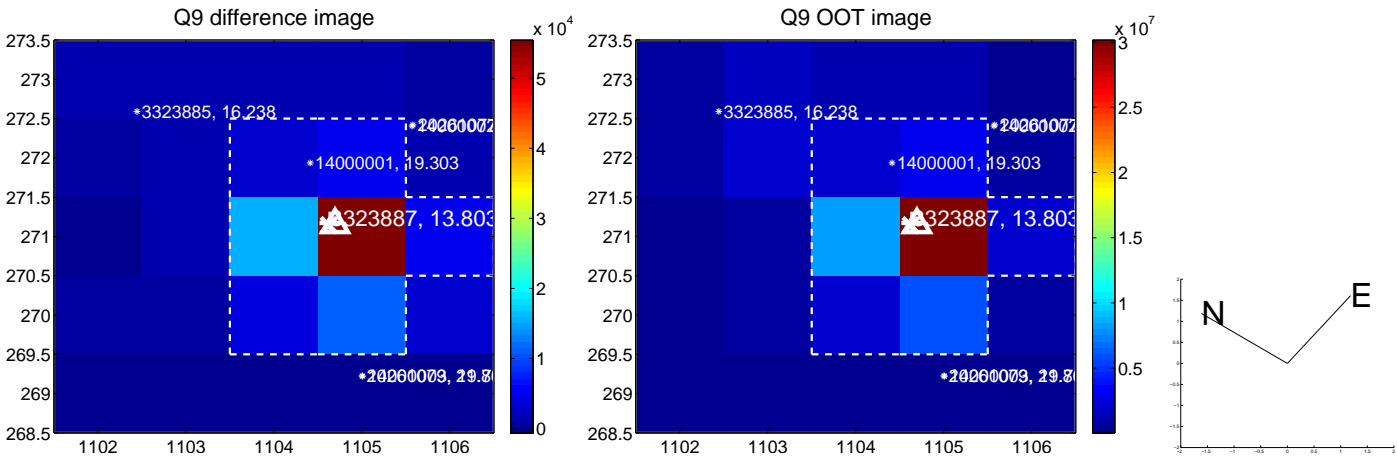
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



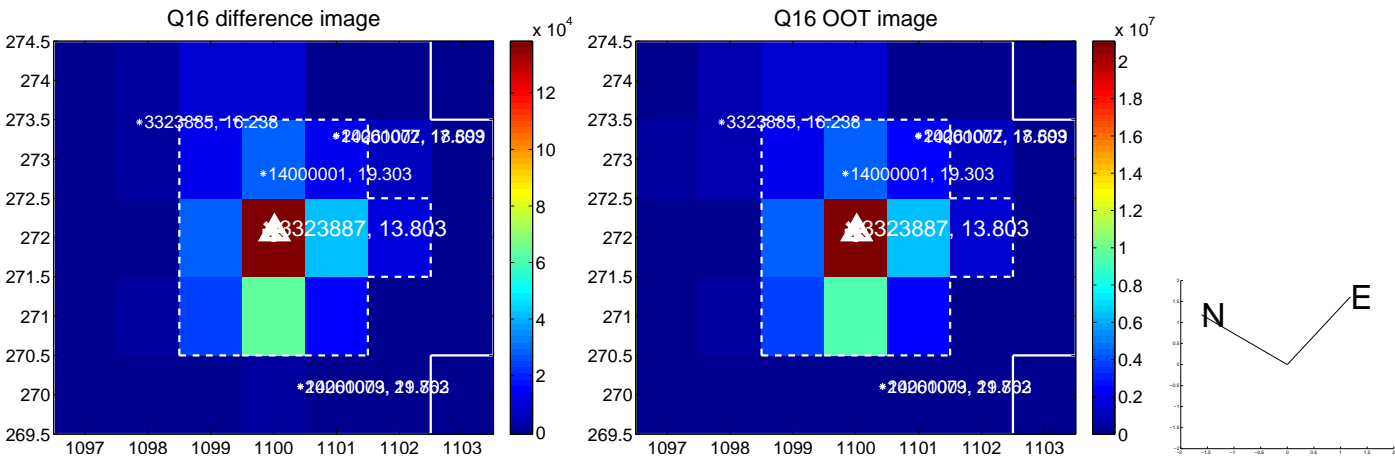
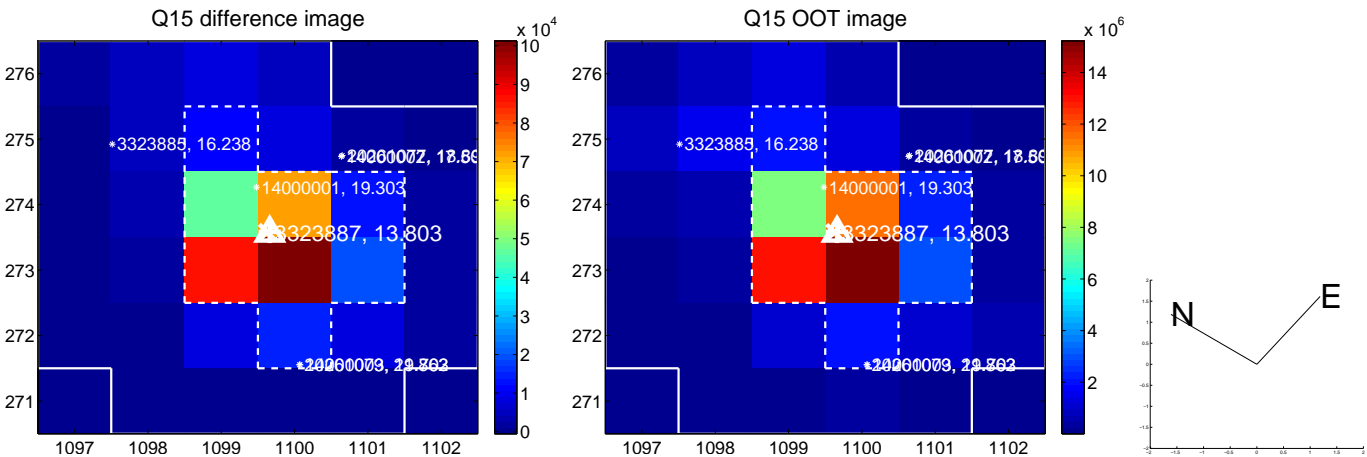
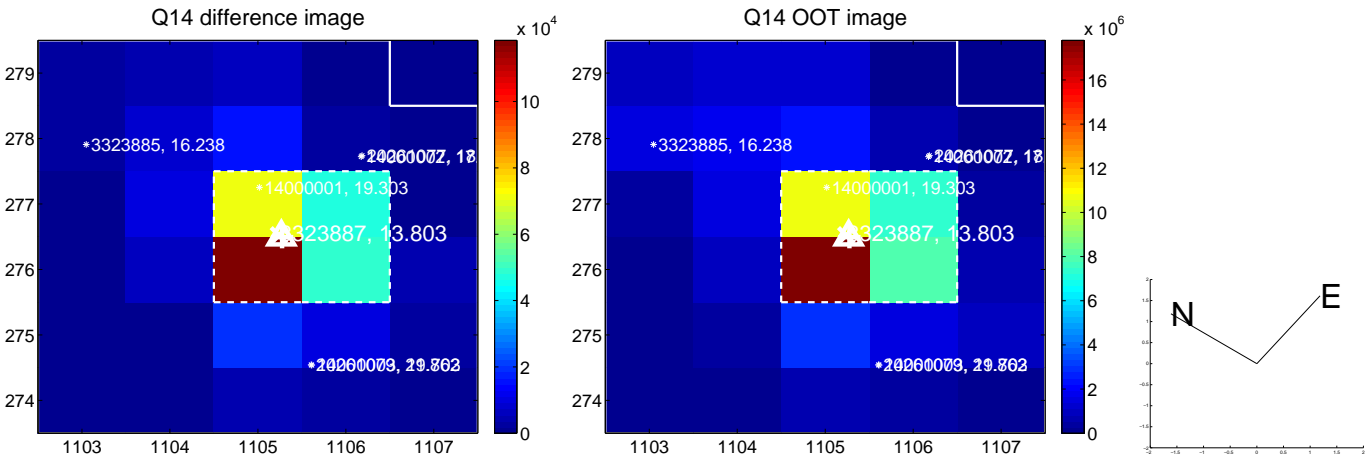
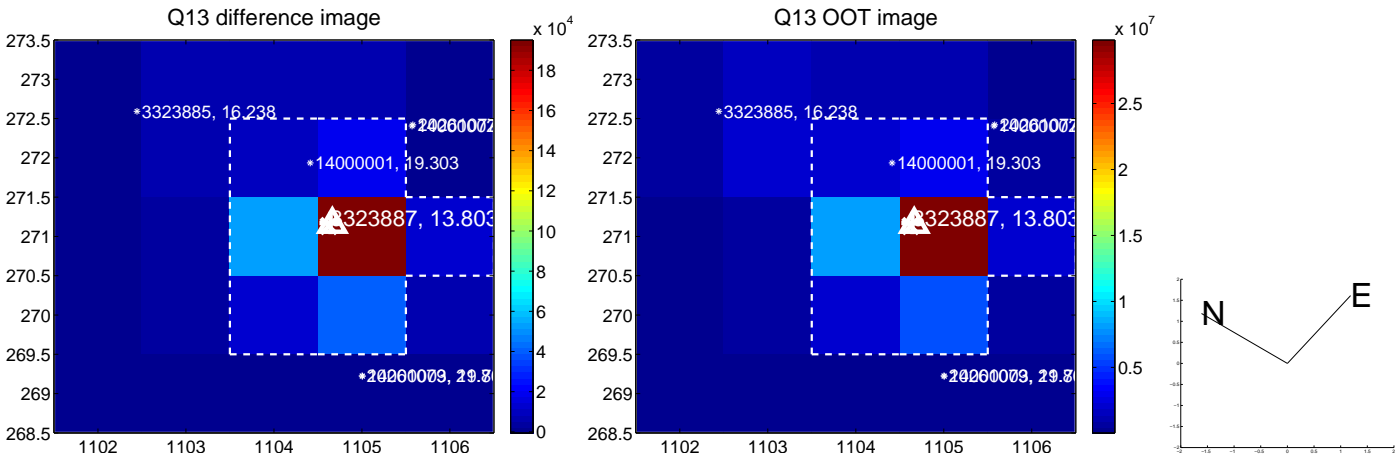
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



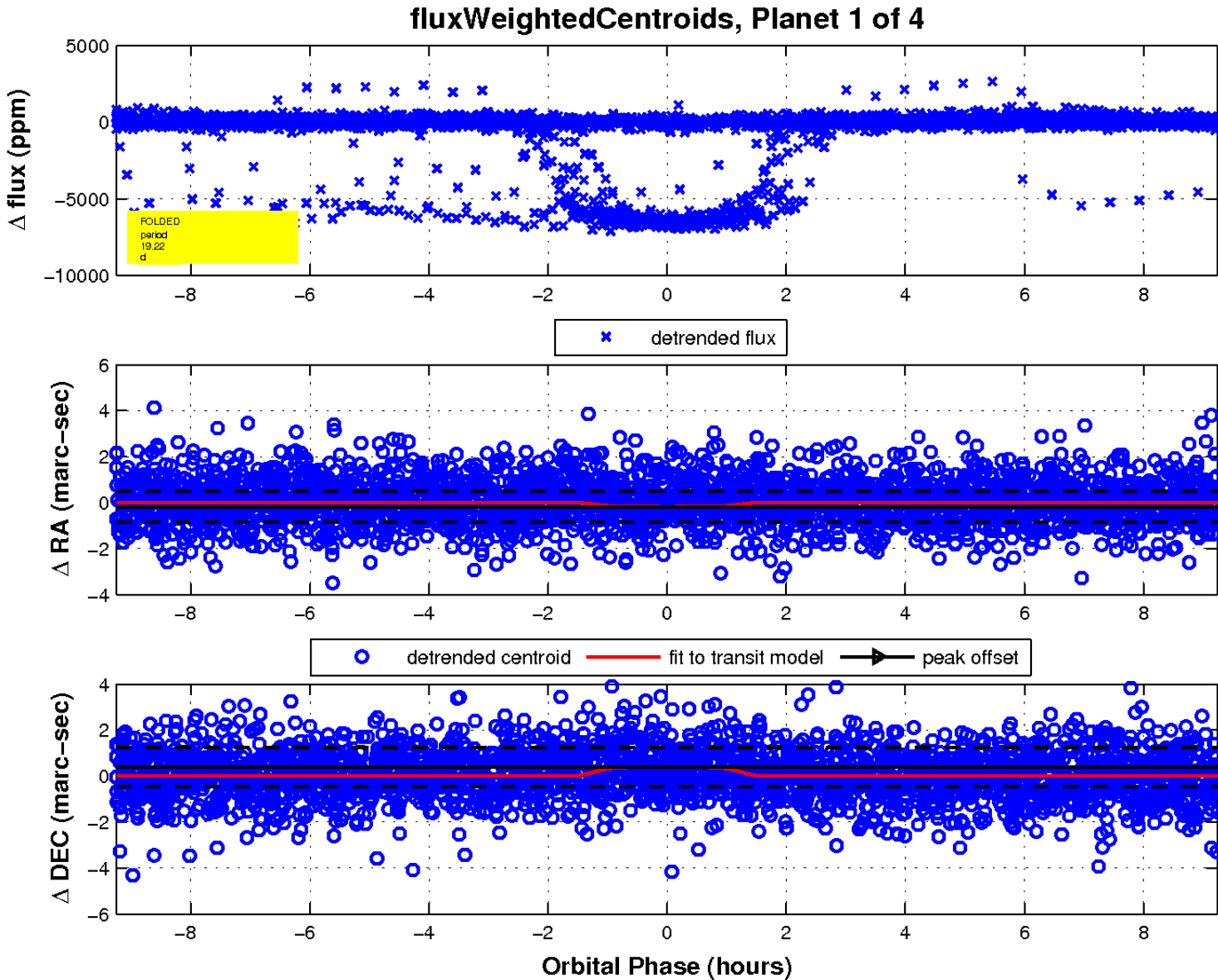
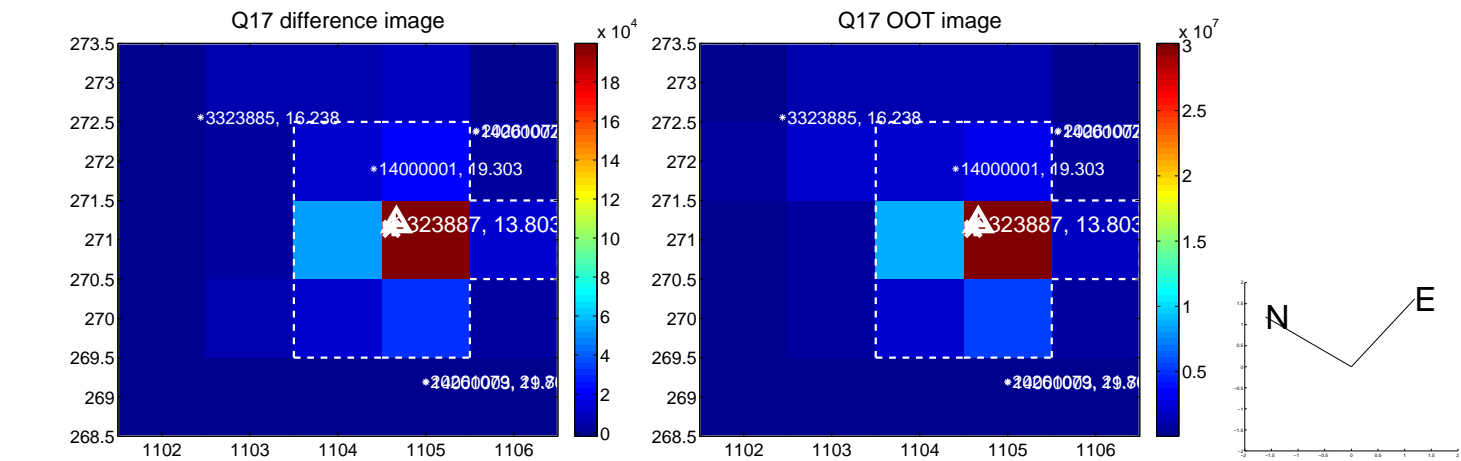
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

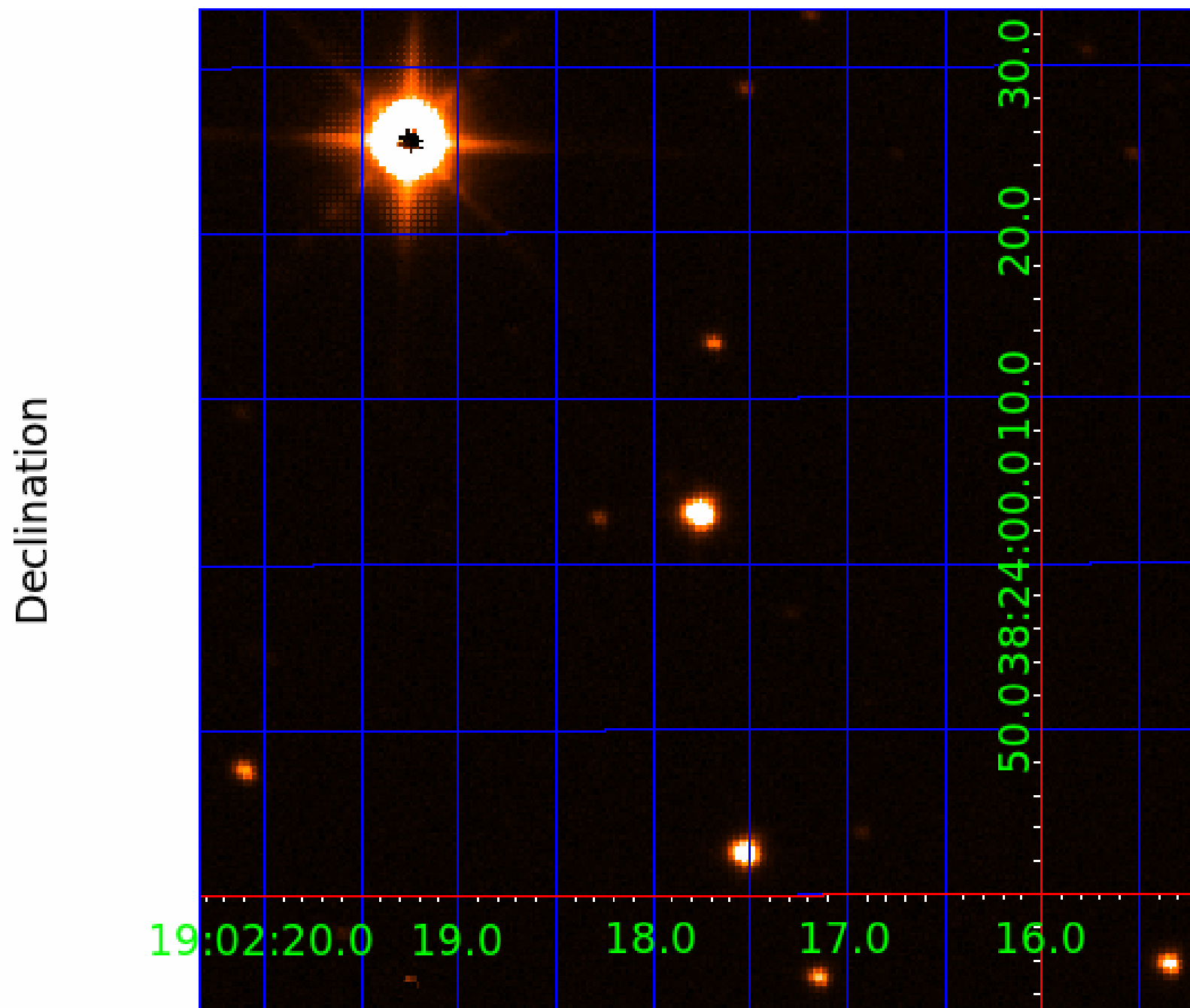


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.





UKIRT Image



# KIC 003323887

## Q1-17 DR25 TCE Parameters

TCE	Run Type	KOI?	Period (Days)	Epoch (BKJD)	Depth (ppm)	Duration (Hours)	MES	SNR	$R_{\star}$ ( $R_{\odot}$ )	$T_{\star}$ (K)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
003323887-01	OBS	No	19.222229	145.864428	5737.6	3.084	166.3	214.7	0.96	5779	8.07	45.31
003323887-02	OBS	0377.01	19.276130	143.884976	304.7	5.345	135.7	14.9	0.96	5779	2.01	45.14
003323887-03	OBS	No	39.065814	132.509654	345.1	5.247	100.7	12.3	0.96	5779	2.31	17.60
003323887-04	OBS	No	38.810860	137.239202	3974.5	4.500	84.2	-1.0	0.96	5779	5.96	17.76

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
003323887-01	OBS	FP	0.00	1	0	1	0	LPP_DV—HALO_GHOST
003323887-02	OBS	FP	0.00	1	0	0	0	LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
003323887-03	OBS	FP	0.01	1	0	0	0	MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
003323887-04	OBS	FP	0.00	1	0	1	0	LPP_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—CENT_NOFITS—HALO_GHOST

**Notes:** OBS = Observed. INJ = Injected. INV = Inverted. SCR = Scrambled.

N = Not Transit-Like. S = Stellar Eclipse. C = Centroid Offset. E = Ephemeris Match.

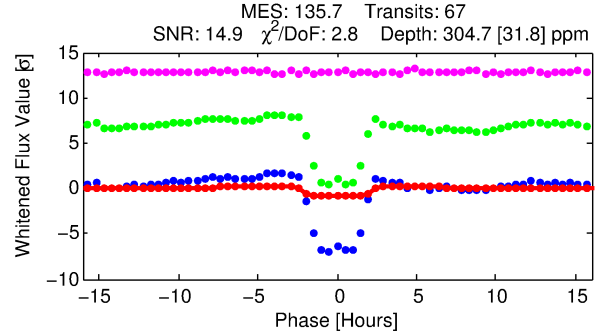
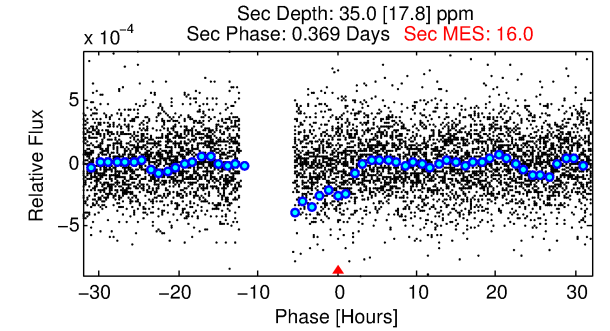
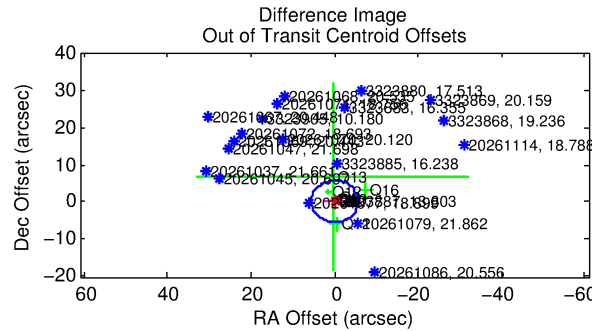
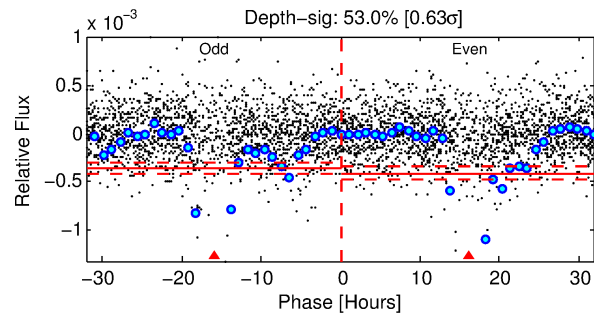
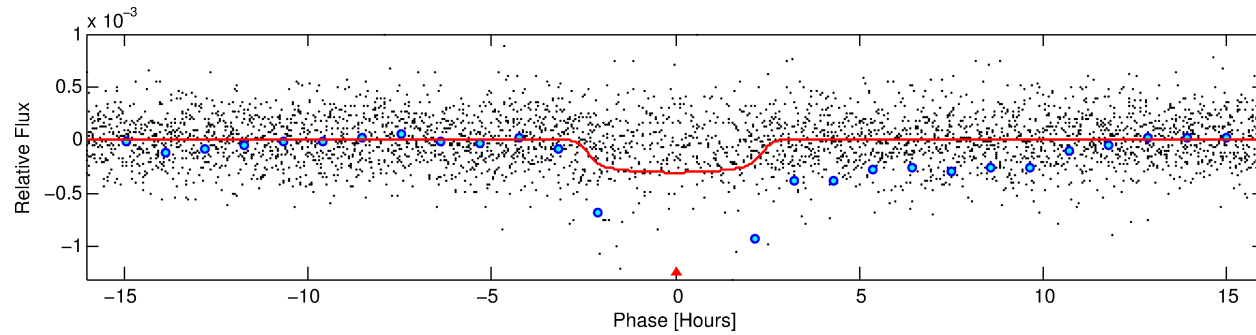
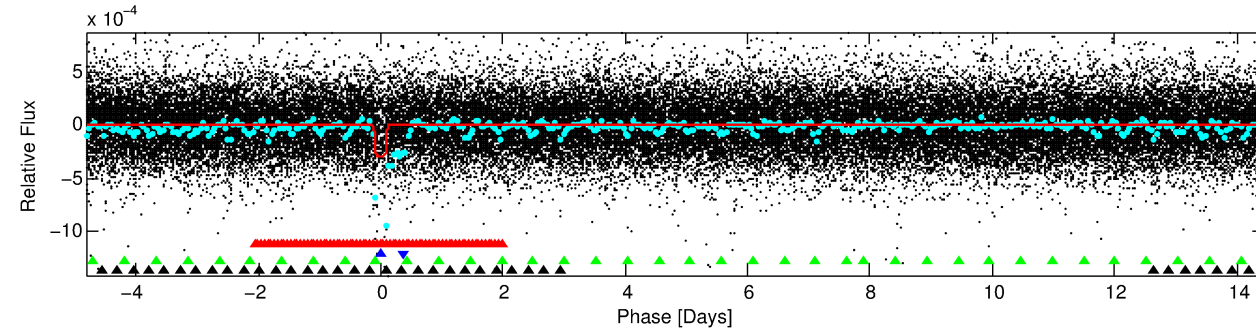
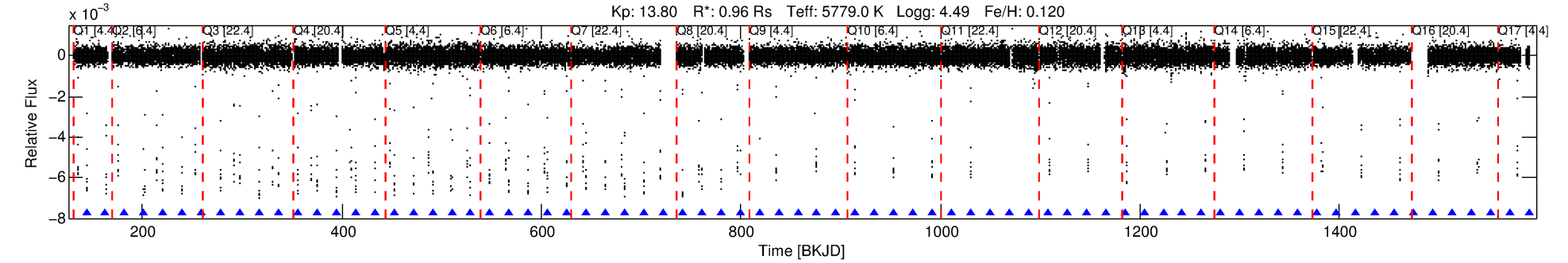
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 003323887-02

No Significant Match Found

# DV One-Page Summary

KIC: 3323887 Candidate: 2 of 4 Period: 19.276 d  
KOI: K00377 Name: Kepler-9 Corr: No Ephemeris Match



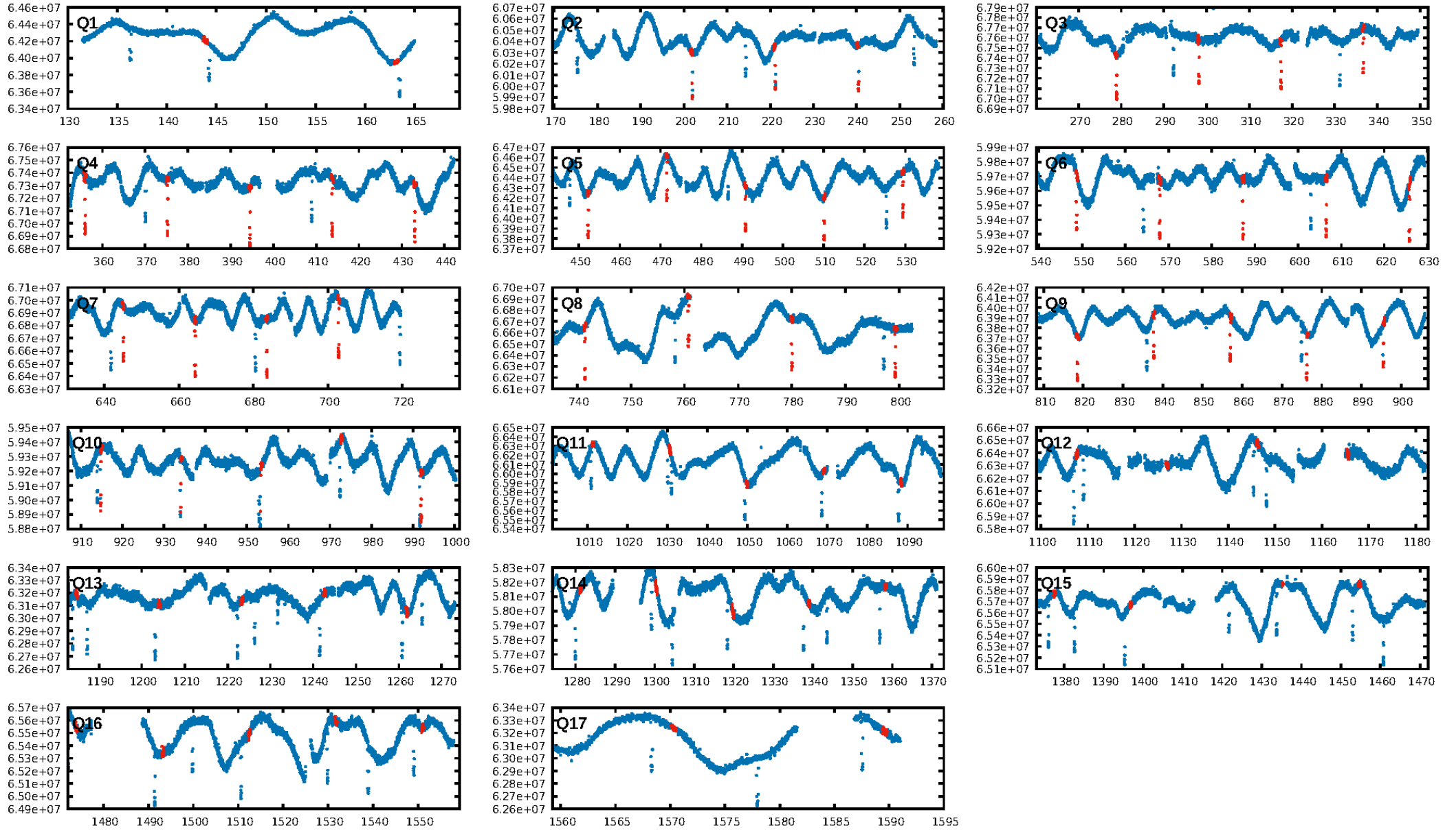
## DV Fit Results:

Period = 19.27613 [0.00018] d  
Epoch = 143.8850 [0.0078] BKJD  
Rp/R\* = 0.0193 [0.0029]  
a/R\* = 12.61 [7.98]  
b = 0.91 [0.12]  
Seff = 45.14 [10.76]  
Teff = 661 [39] K  
Rp = 2.01 [0.43] Re  
a = 0.1422 [0.0202] AU  
Ag = 96.22 [60.84] [1.57σ]  
Teffp = 3201 [479] K [5.28σ]

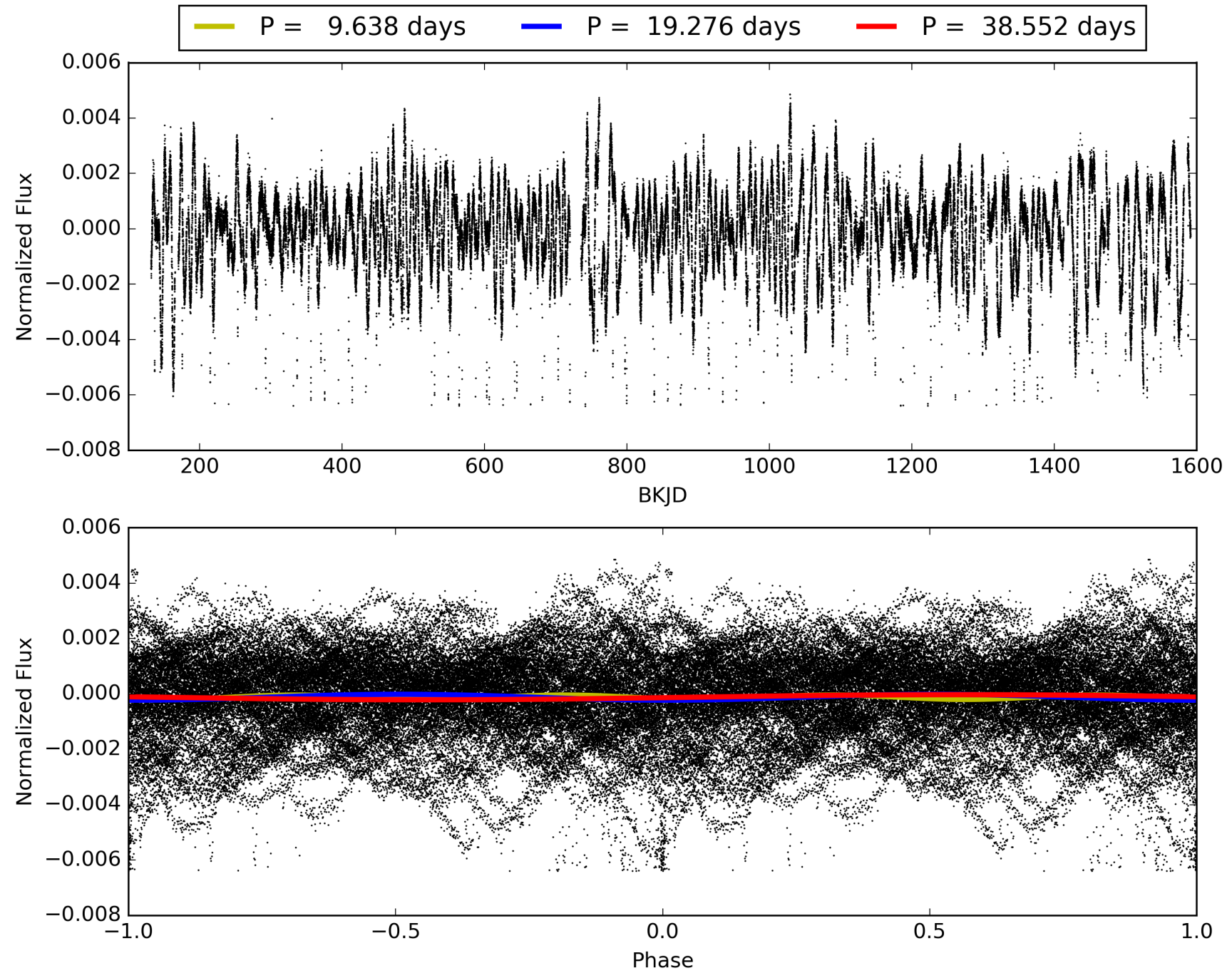
## DV Diagnostic Results:

ShortPeriod-sig: 16.6% [0.21σ]  
LongPeriod-sig: 100.0% [67.10σ]  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGof-sig: 27.9%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [63/63]  
GhostDiagnostic-chr: 2.444  
Centroid-sig: 71.9%  
Centroid-so: 0.266 arcsec [0.63σ]  
OotOffset-rm: 0.024 arcsec [0.01σ]  
KicOffset-rm: 0.157 arcsec [0.07σ]  
OotOffset-st: 3/3/4/4 [14]  
KicOffset-st: 3/3/4/4 [14]  
DiffImageQuality-fgm: 0.50 [7/14]  
DiffImageOverlap-fno: 0.82 [14/17]

# TCE 00323887-02, PDC Light Curves



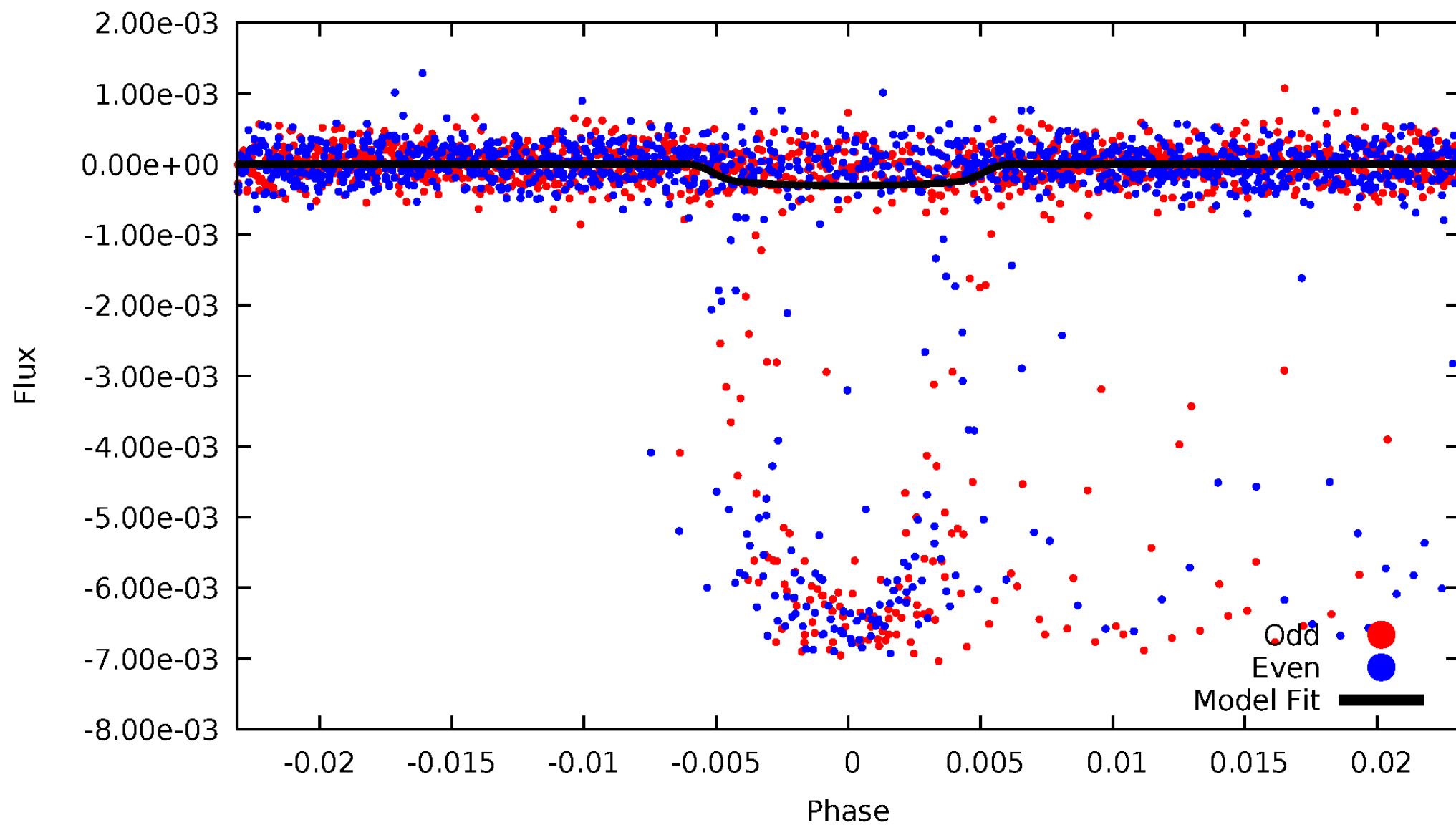
TCE 003323887-02





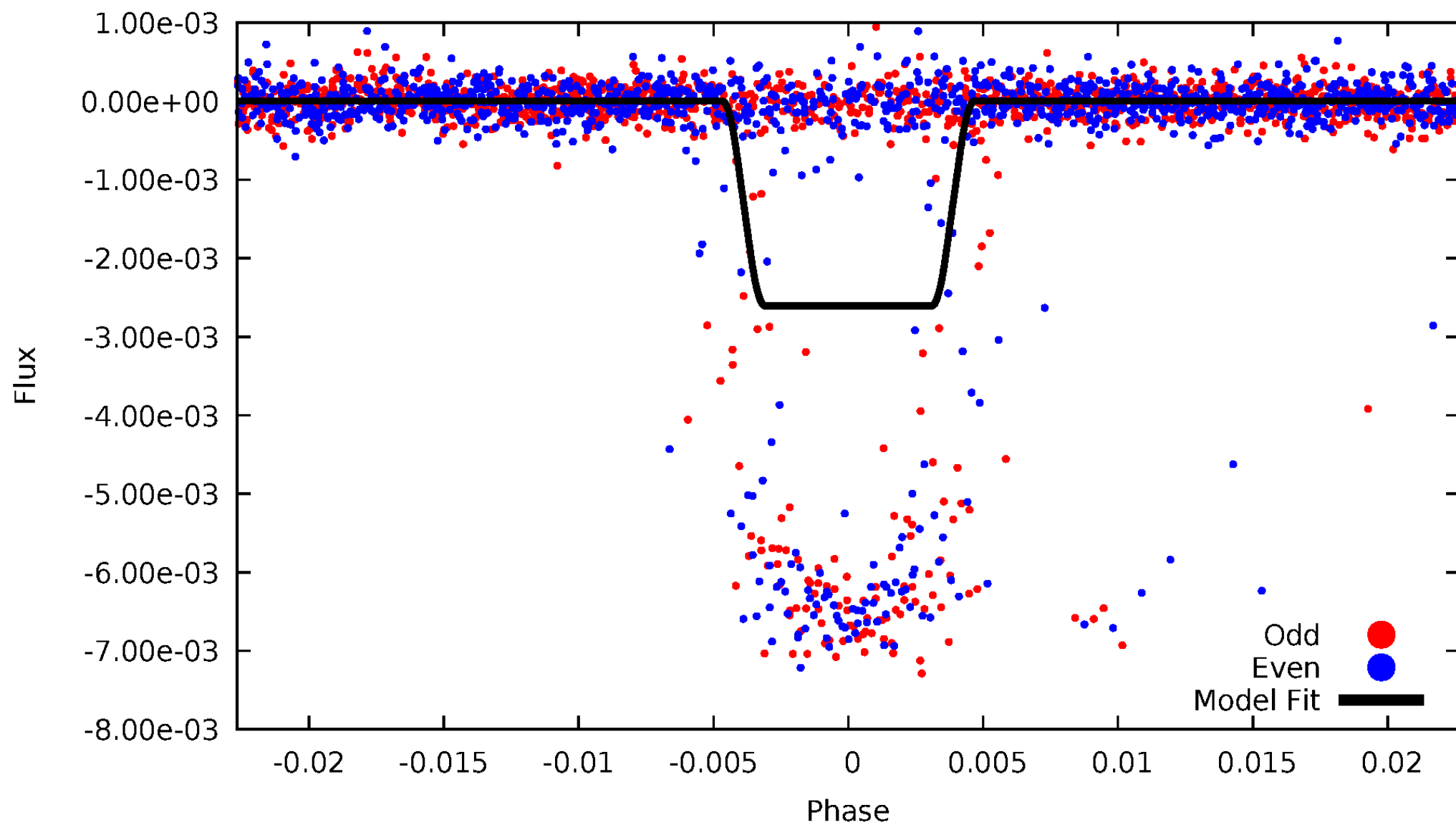
# DV Odd/Even

TCE 003323887-02



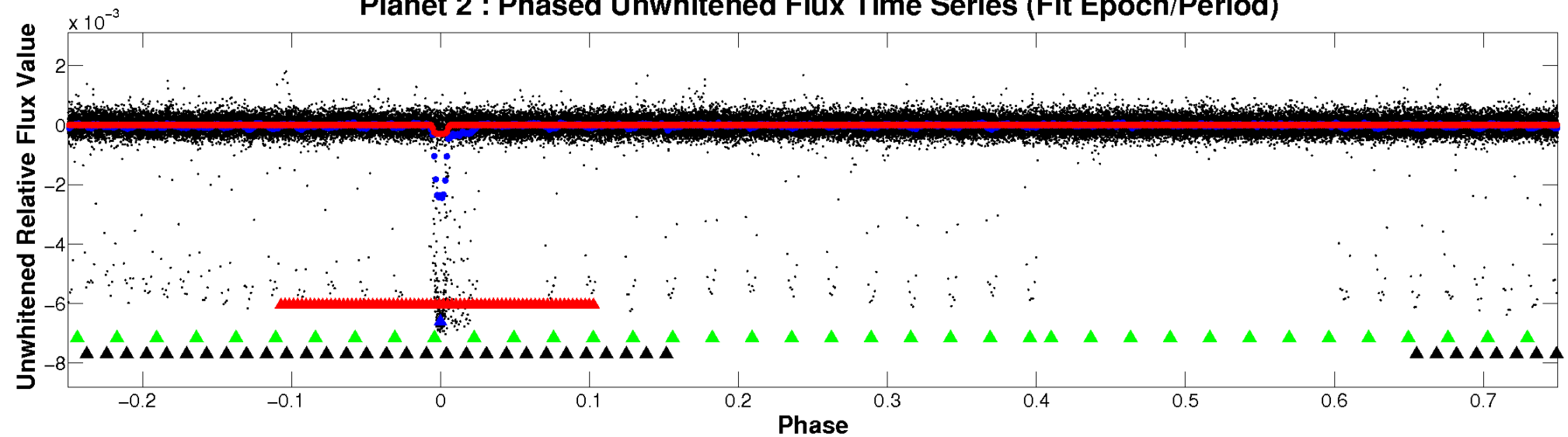
# ALT Odd/Even

TCE 003323887-02

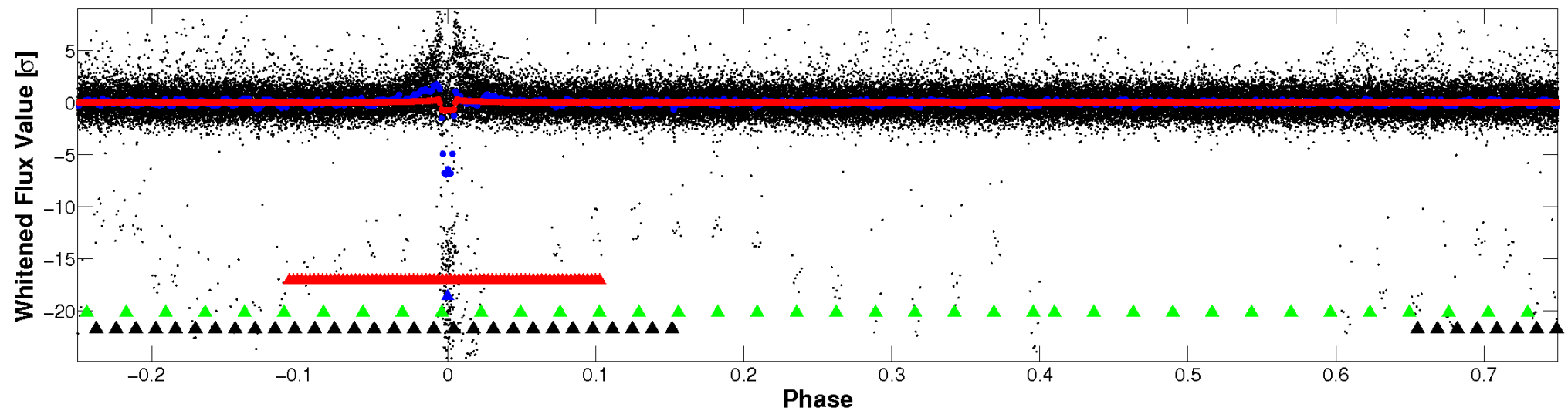


# Non-Whitened Vs. Whitened Light Curve

Planet 2 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)

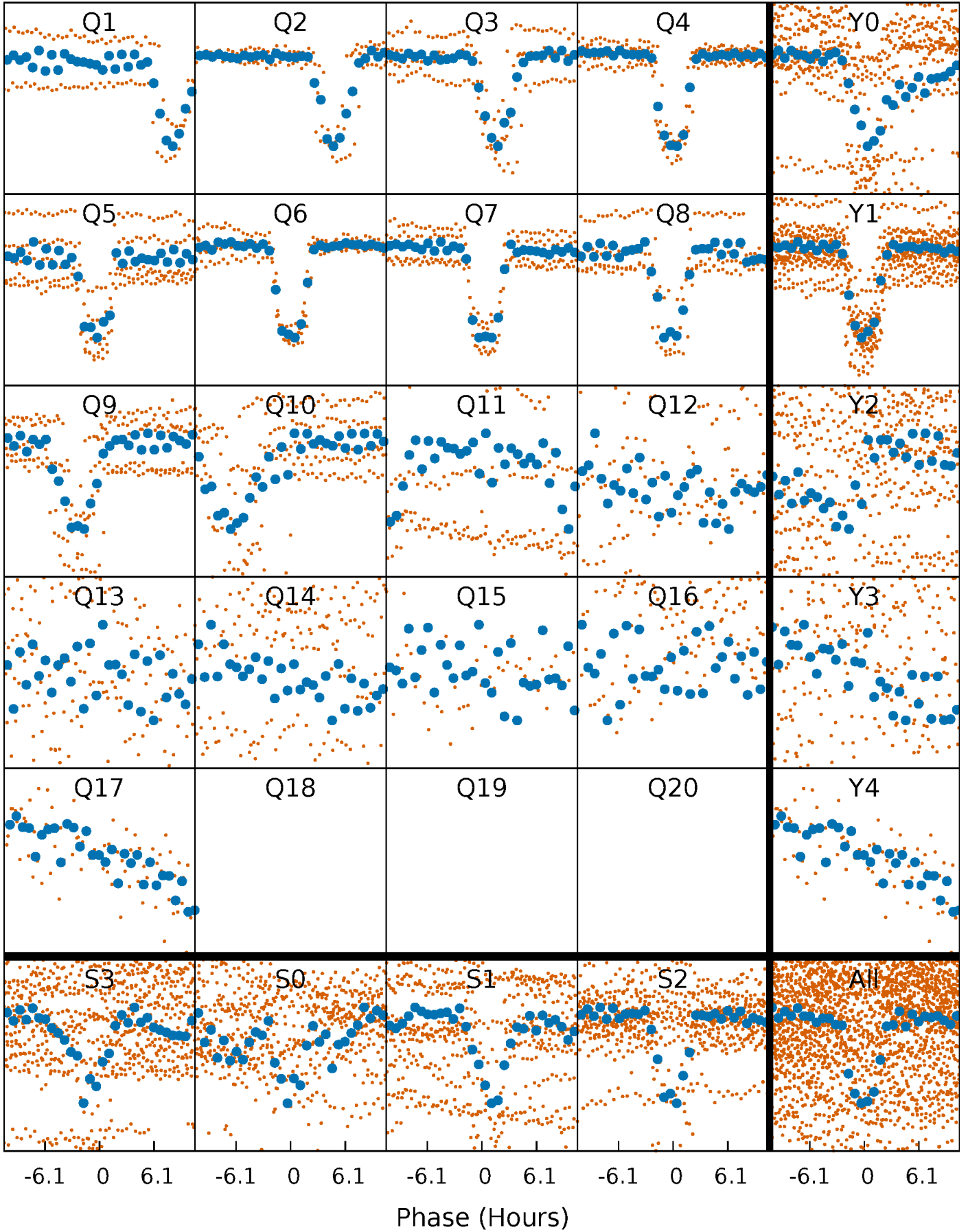


Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



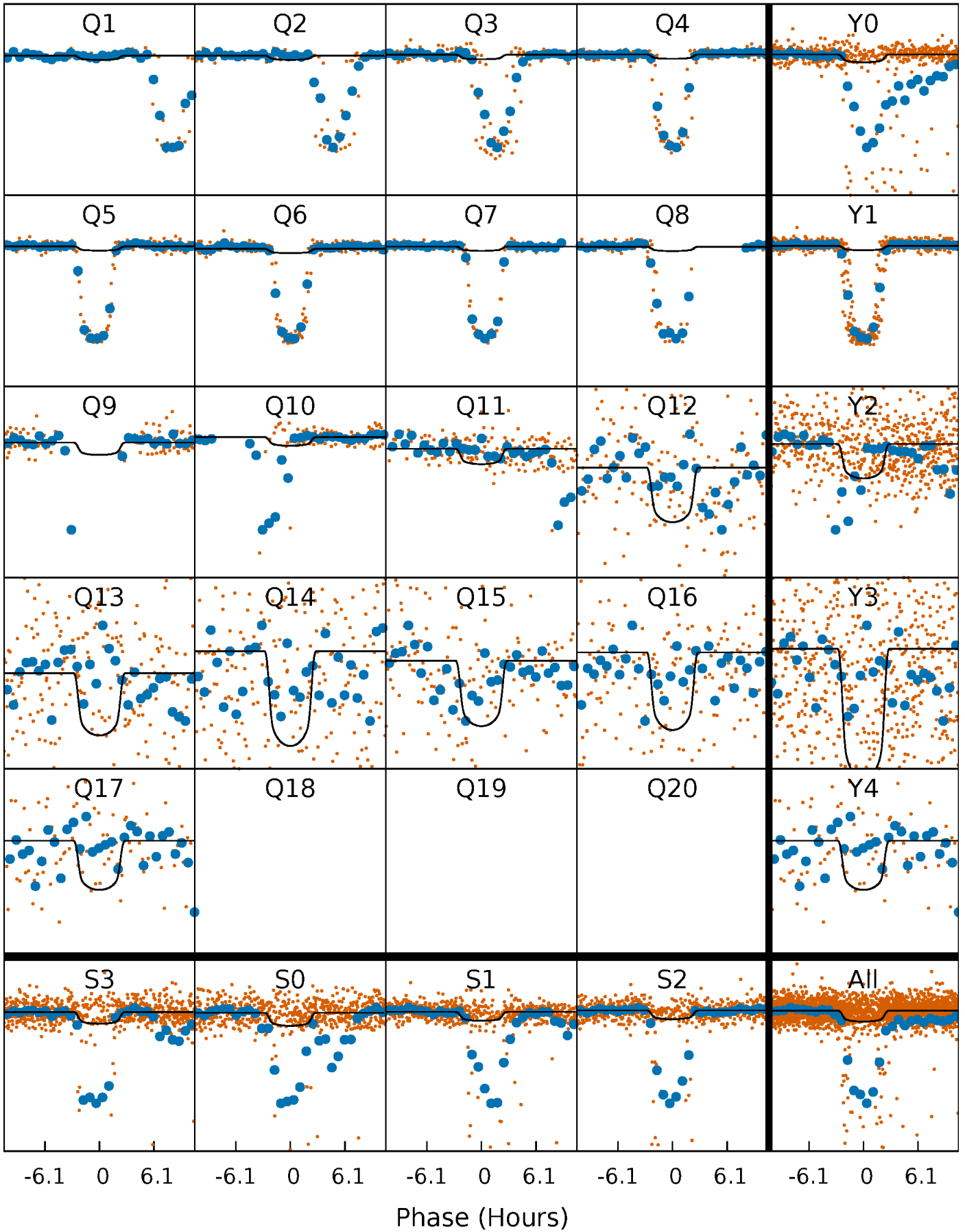
# PDC Quarter-Phased Transit Curves

TCE 003323887-02 P= 19.276130 Days  $T_0=143.884976$  (BKJD)



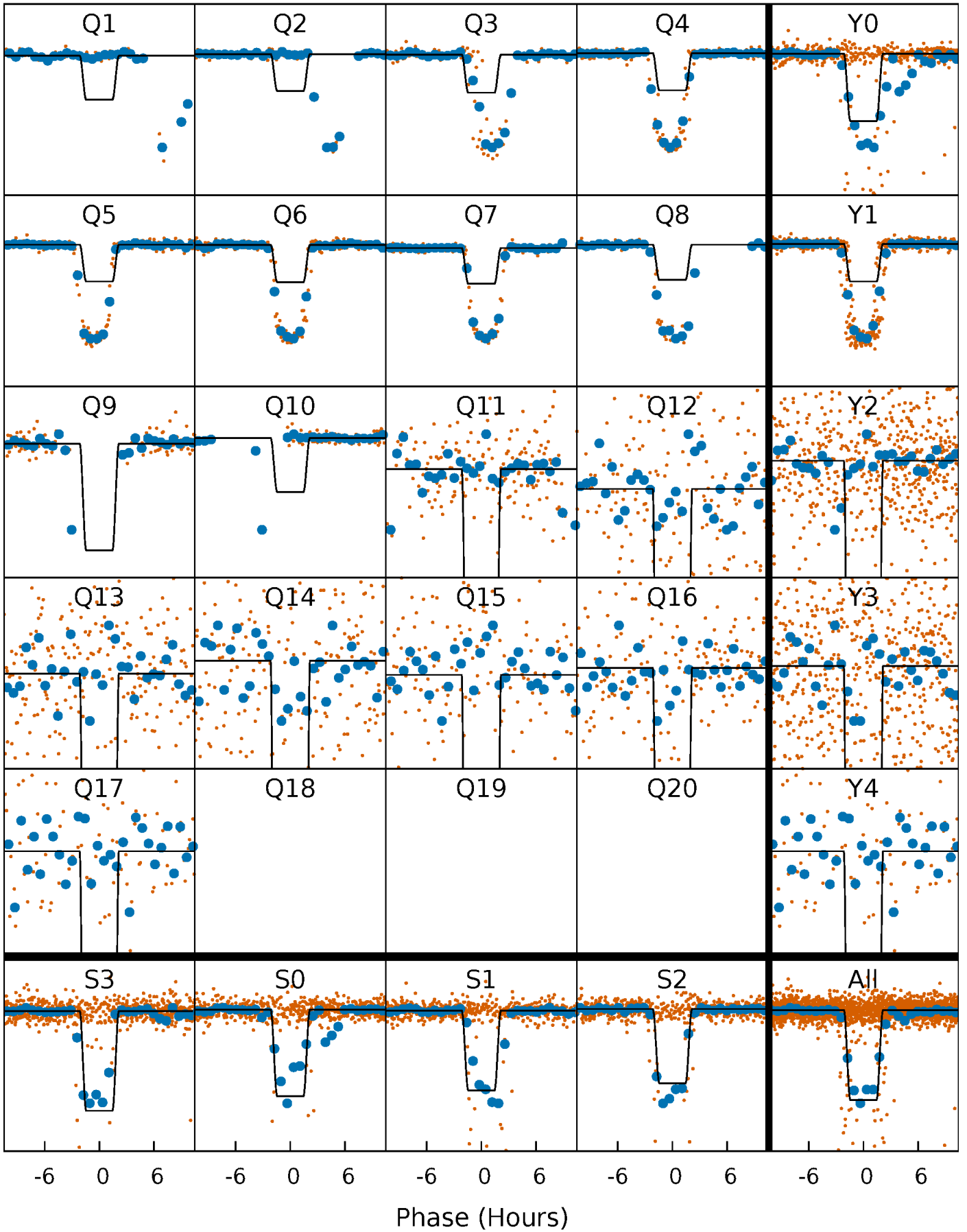
# DV Quarter-Phased Transit Curves

TCE 003323887-02     $P = 19.276130$  Days     $T_0 = 143.884976$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

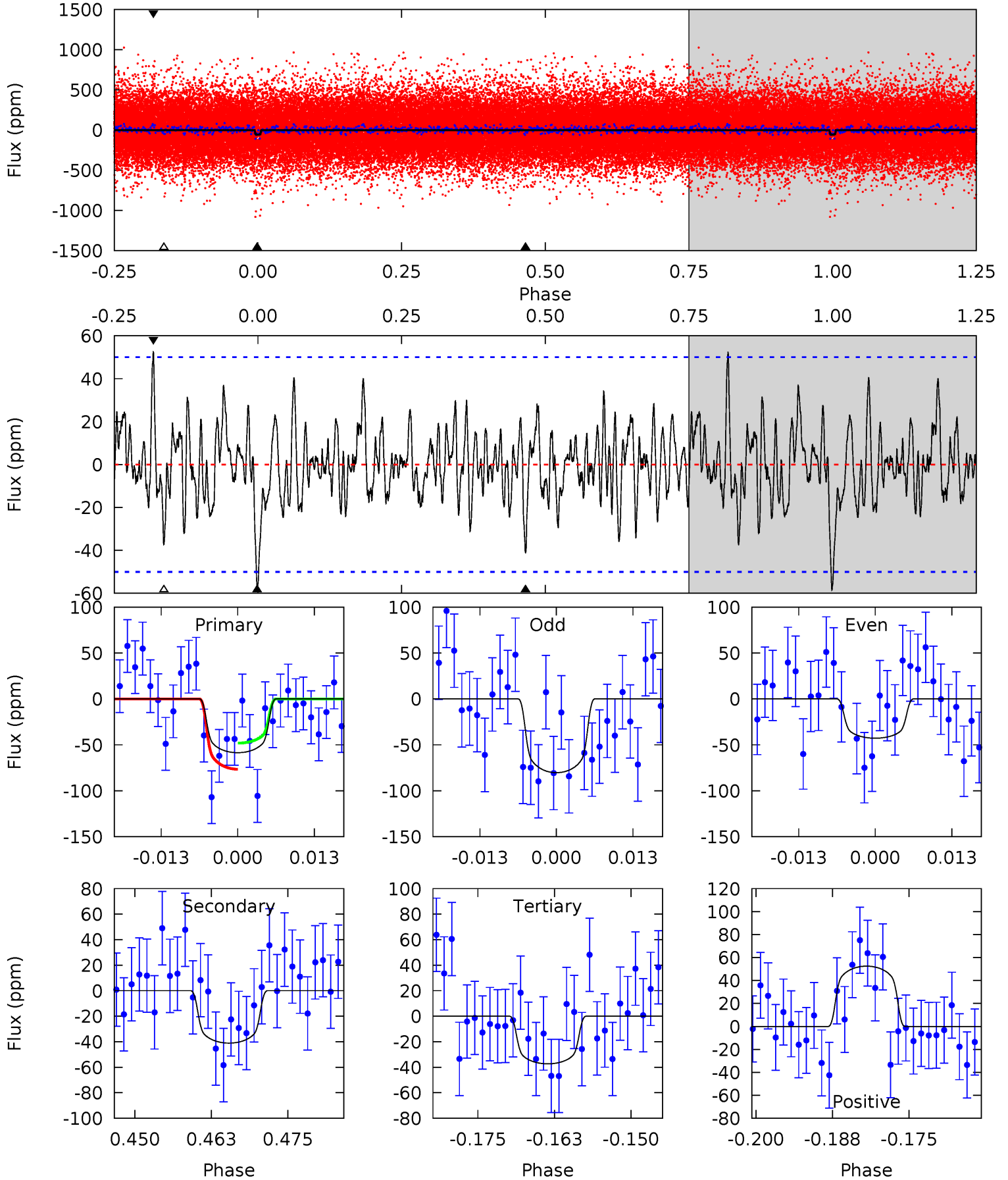
TCE 003323887-02 P= 19.275262 Days  $T_0=143.907264$  (BKJD)



# DV Model-Shift Uniqueness Test

003323887-02, P = 19.276130 Days, E = 124.608846 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
5.83	4.09	3.71	5.22	4.98	2.50	1.38	2.11	0.60	0.37	-1.14	1.86	10.9	0.47	1.41

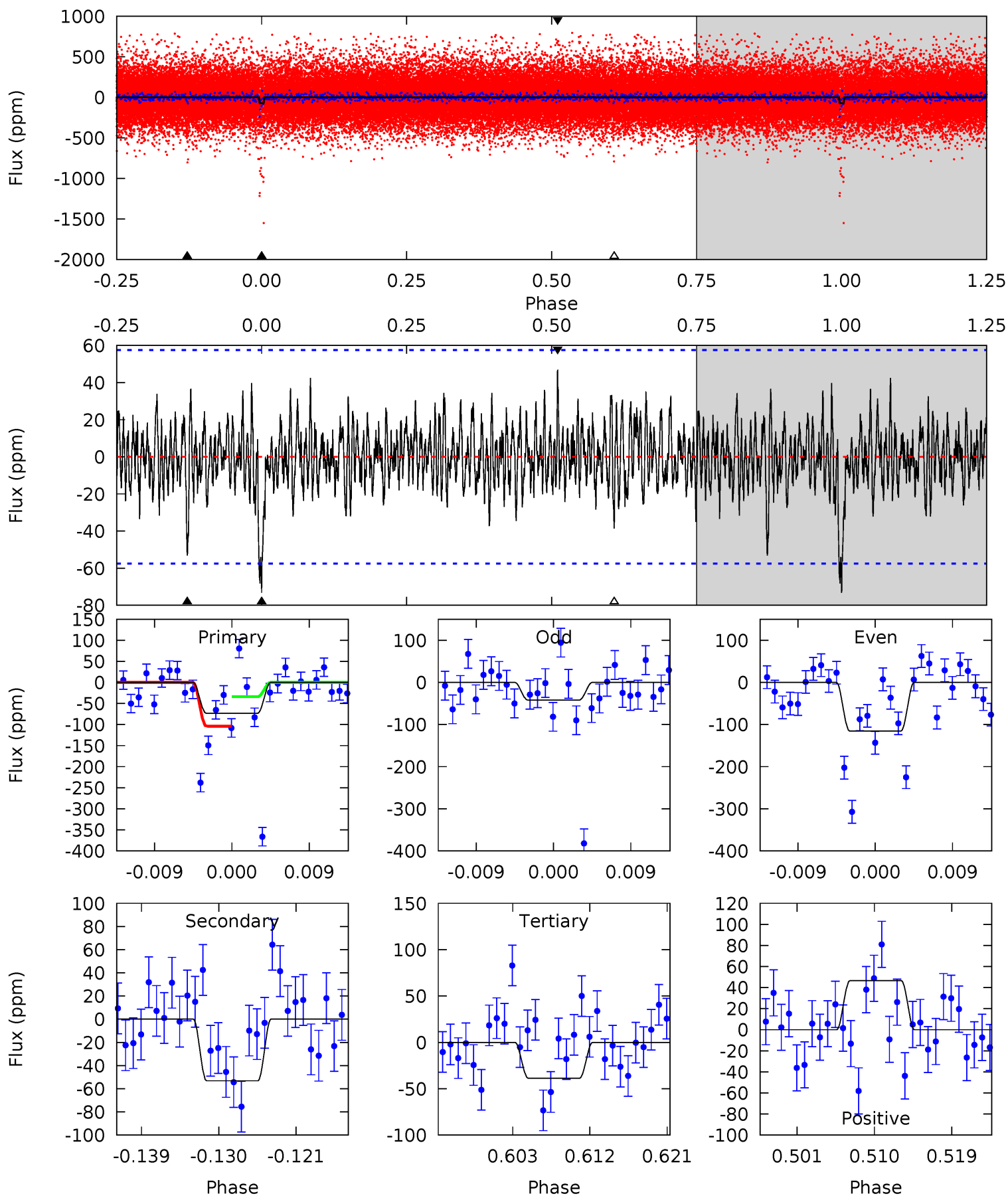




# Alt Model-Shift Uniqueness Test

003323887-02, P = 19.275262 Days, E = 124.632002 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
6.41	4.65	3.38	4.08	5.04	2.60	1.18	3.03	2.34	1.27	0.58	3.18	16.1	0.39	3.02



### Stellar Parameters For KIC 003323887

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5779^{+104}_{-127}$	$4.491^{+0.030}_{-0.128}$	$0.120^{+0.150}_{-0.150}$	$0.956^{+0.147}_{-0.053}$	$1.034^{+0.058}_{-0.080}$	$1.665^{+0.245}_{-0.561}$
	+2%/-2%	+1%/-3%	+125%/-125%	+15%/-6%	+6%/-8%	+15%/-34%
Source	SPE24	SPE24	SPE24	DSEP		

KIC = Kepler Input Catalog; PHO = Photometry; SPE = Spectroscopy; AST = Asteroseismology  
 TRA = Transits; DESP = Dartmouth Models; MULT = Multiple Models

### Secondary Eclipse Parameters for KIC 003323887-02 / KOI 0377.01

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-41 \pm 10$	$2.04^{+0.35}_{-0.31}$	$933^{+39}_{-26}$	$3721^{+293}_{-230}$	$105^{+58}_{-34}$
Alt.	$-53 \pm 11$	$5.47^{+0.52}_{-0.42}$	$936^{+37}_{-28}$	$2870^{+113}_{-107}$	$19^{+6}_{-5}$

$T_{\text{max}}$  = Theoretical Maximum Planetary Temperature

$T_{\text{obs}}$  = Observed Planetary Temperature (Assuming A=0.3)

$A_{\text{obs}}$  = Observed Albedo (Assuming T=0)

If a secondary eclipse is present, the system is likely an EB if  $T_{\text{obs}} \gg T_{\text{max}}$  AND  $A_{\text{obs}} \gg 1.0$

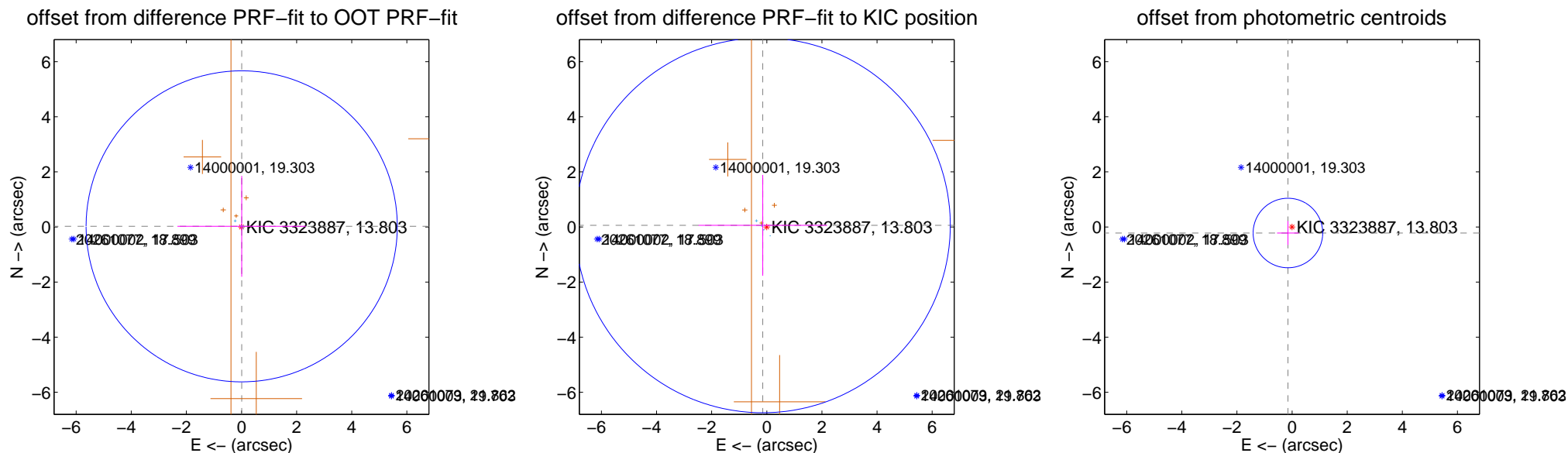
## DV Centroid Data

Supplemental centroid analysis for 003323887-02. Kepler magnitude: 13.80. Transit SNR 14.92

There are 7 quarters with good PRF difference image offsets

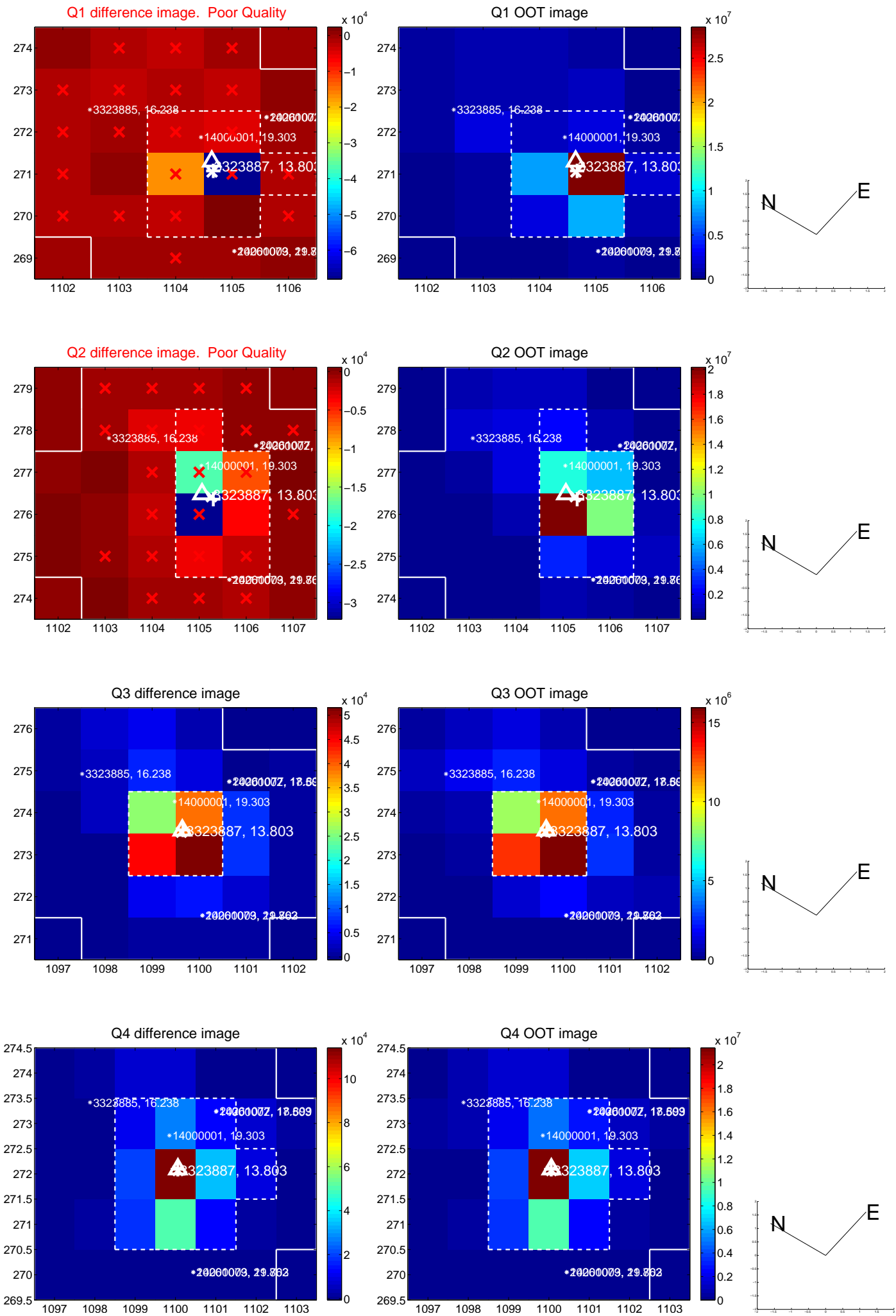
The direct PRF centroid is offset from the target star catalog position by about 0.07 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.024 \pm 1.881$	0.01	$-0.007 \pm 2.331$	$0.023 \pm 1.829$
PRF-fit source offset from KIC position	$0.157 \pm 2.267$	0.07	$0.145 \pm 2.331$	$0.059 \pm 1.829$
photometric centroid source offset	$0.27 \pm 0.42$	0.63	$0.15 \pm 0.39$	$-0.22 \pm 0.43$

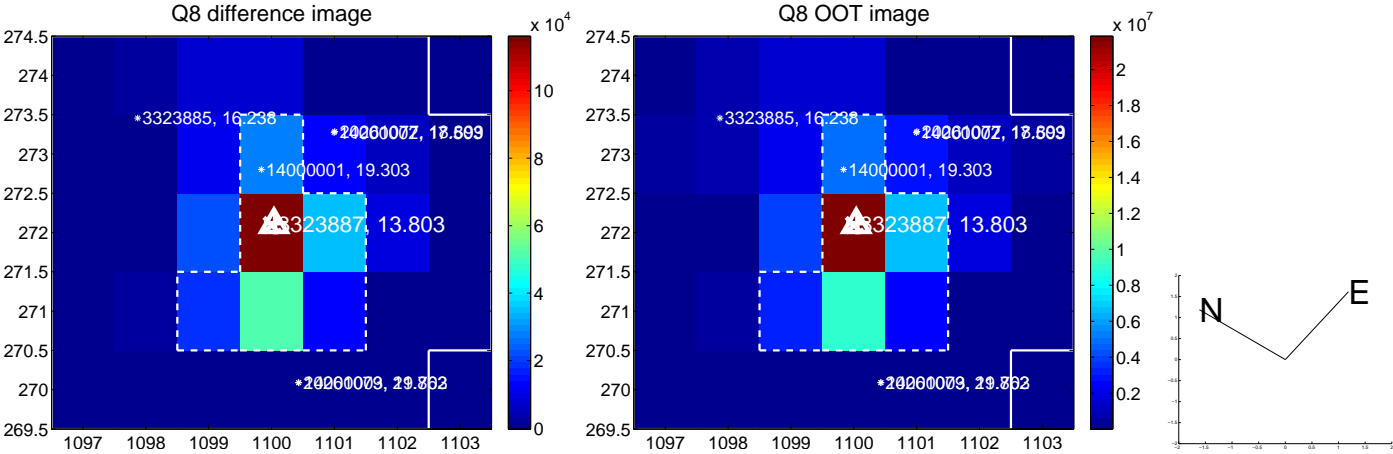
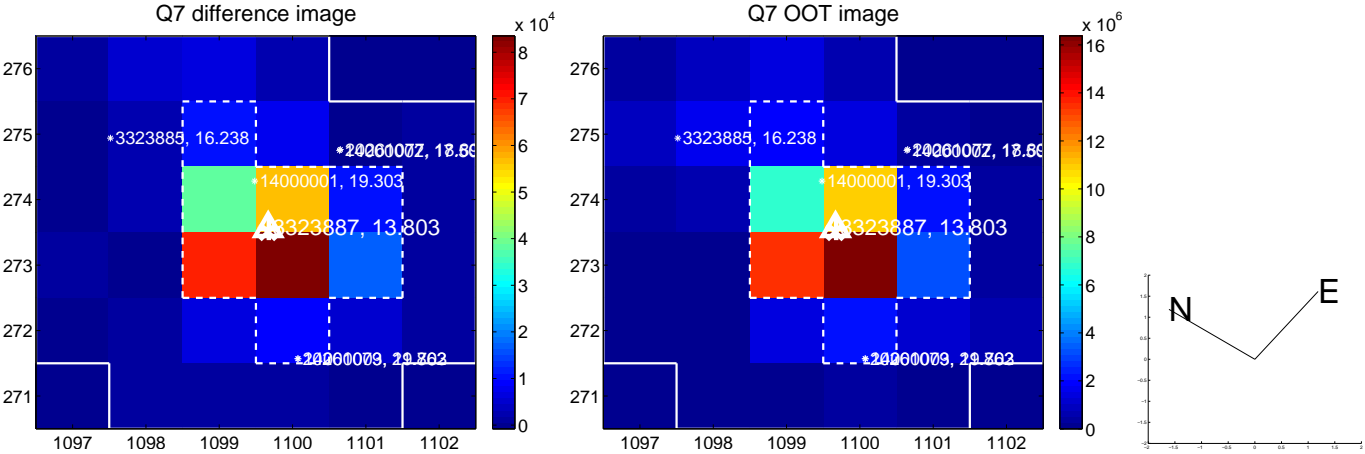
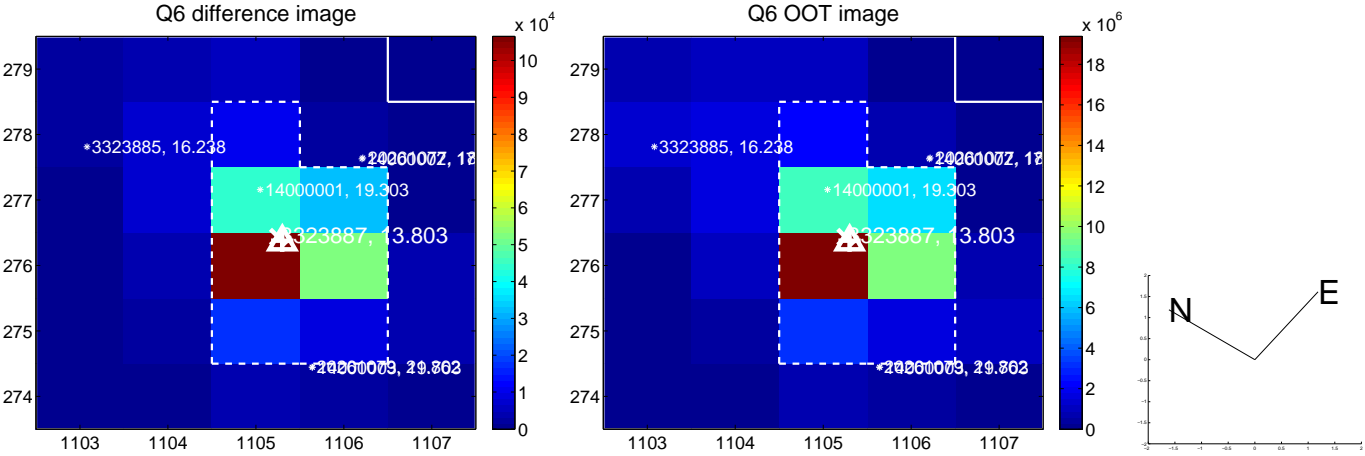
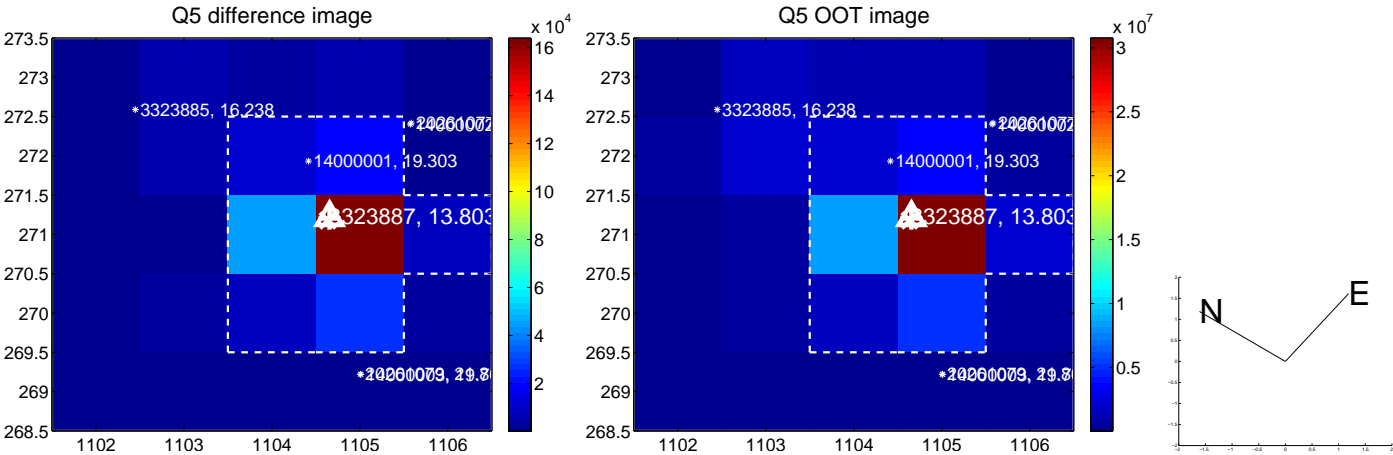


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three- $\sigma$ . Red \*: target star. Blue \*: Other stars. Text next to a star gives its KIC ID and kepmag. KIC IDs > 15,000,000 are from the UKIRT catalog.

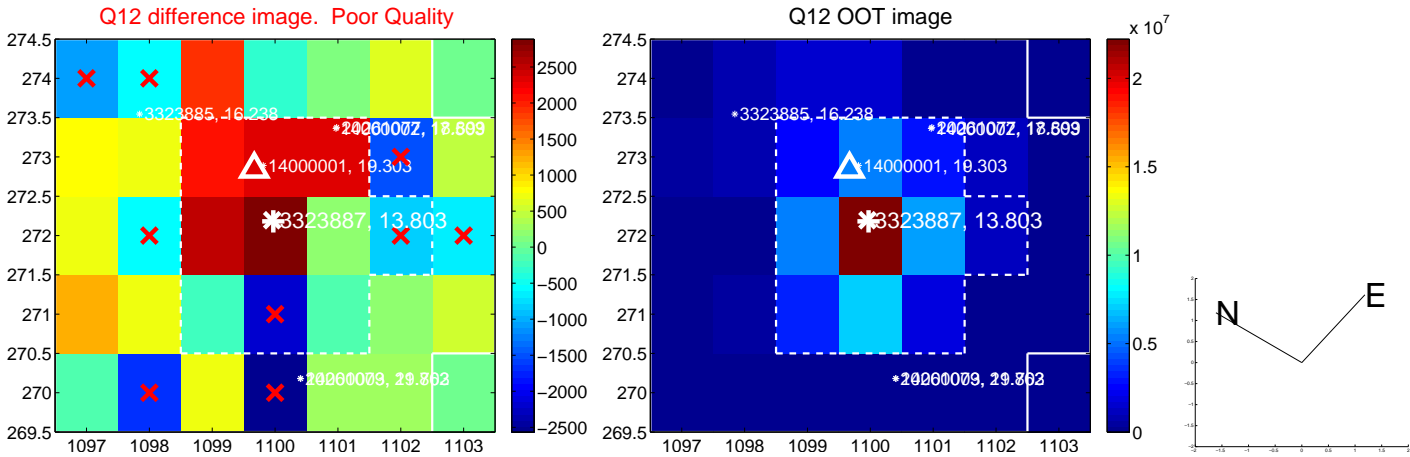
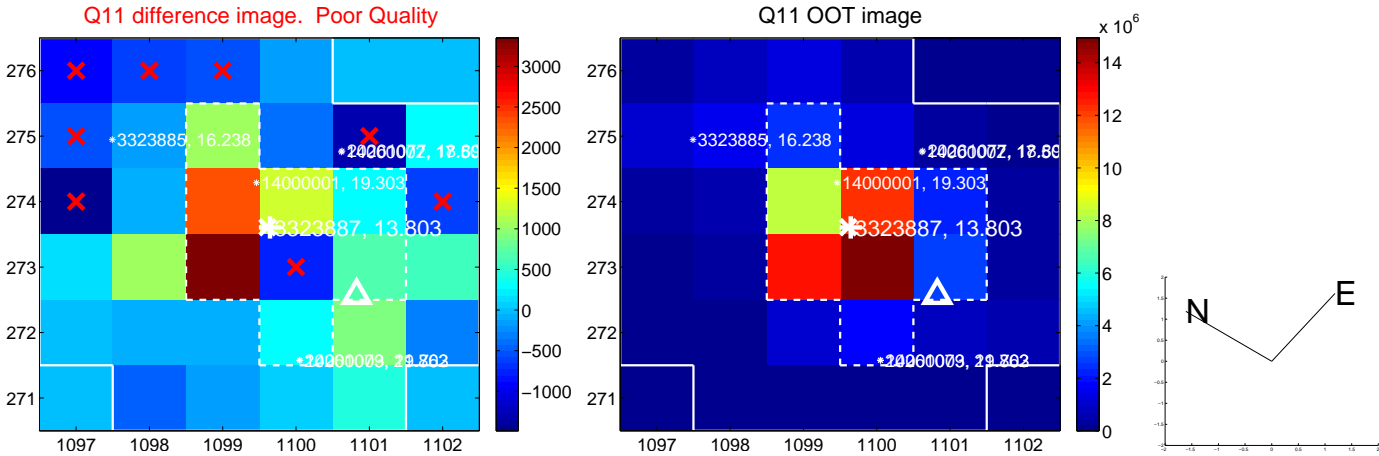
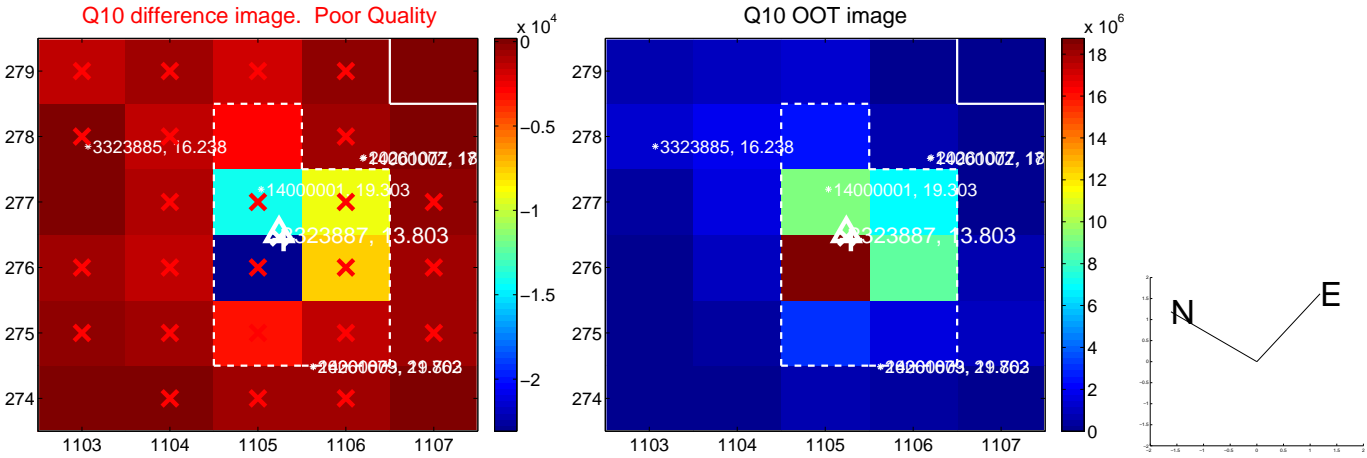
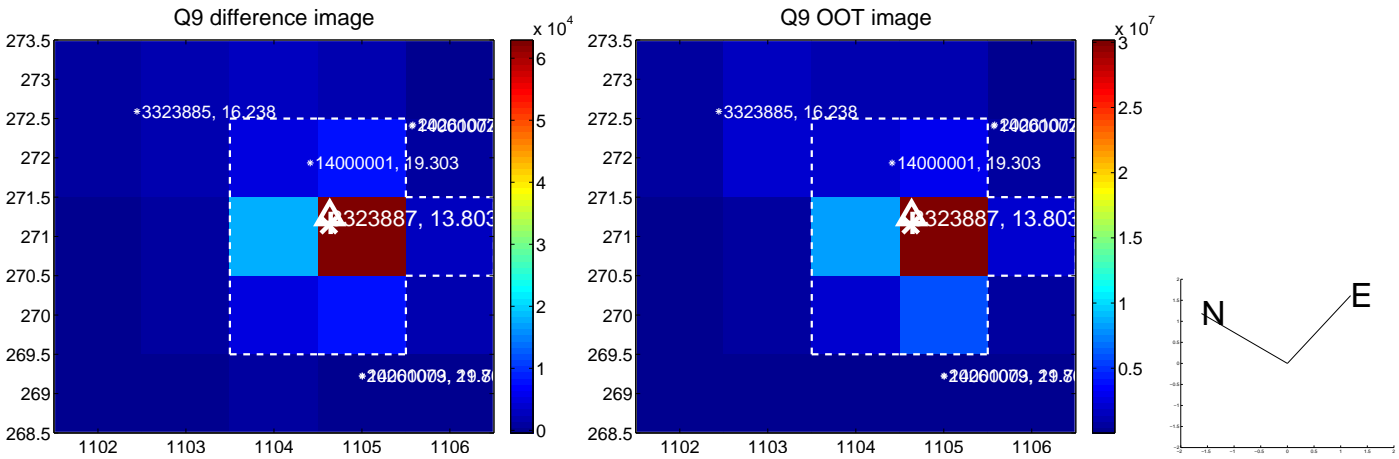
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

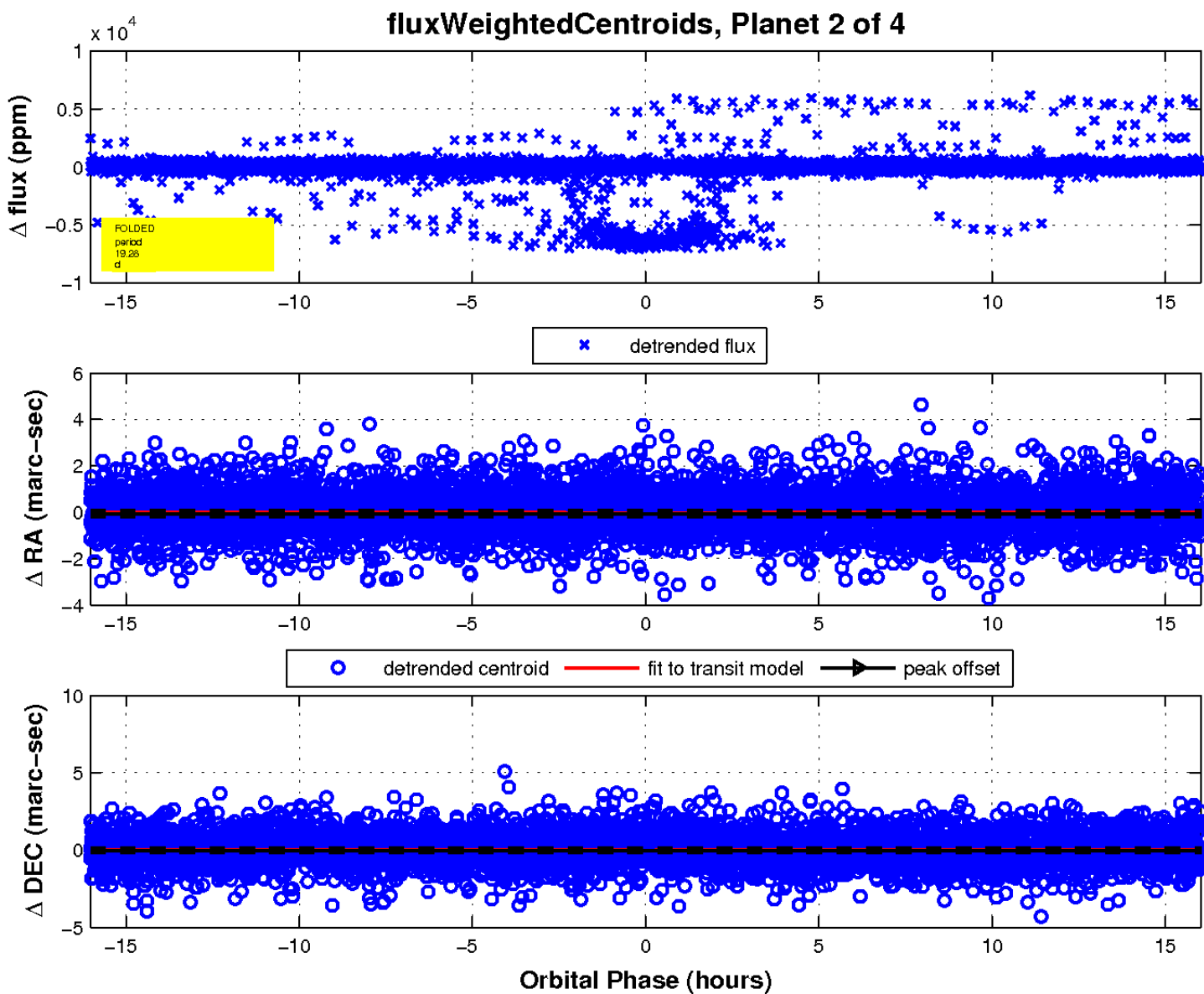
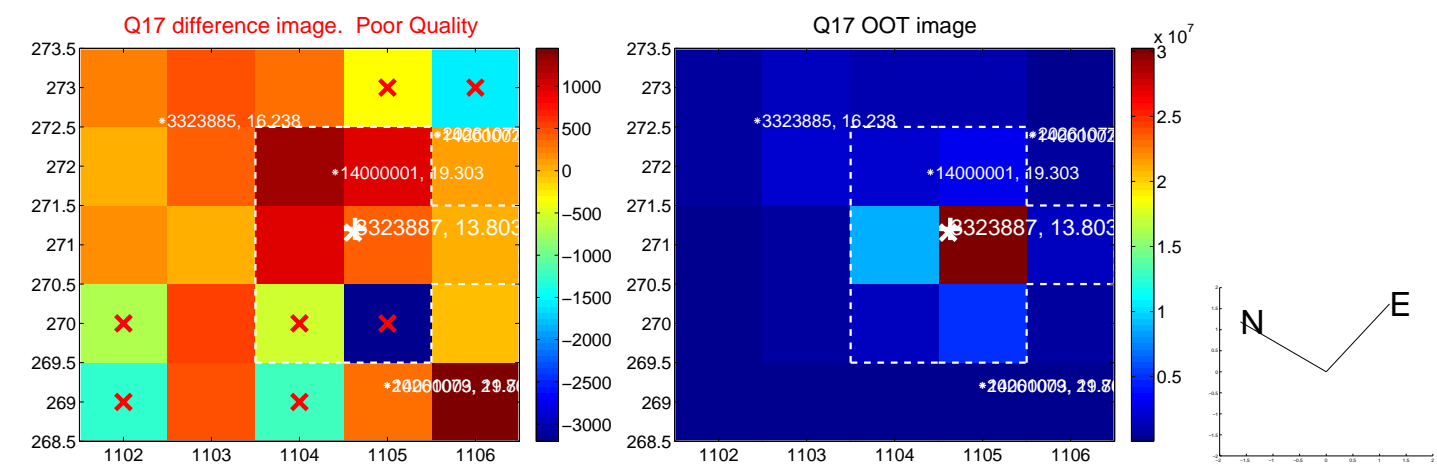


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



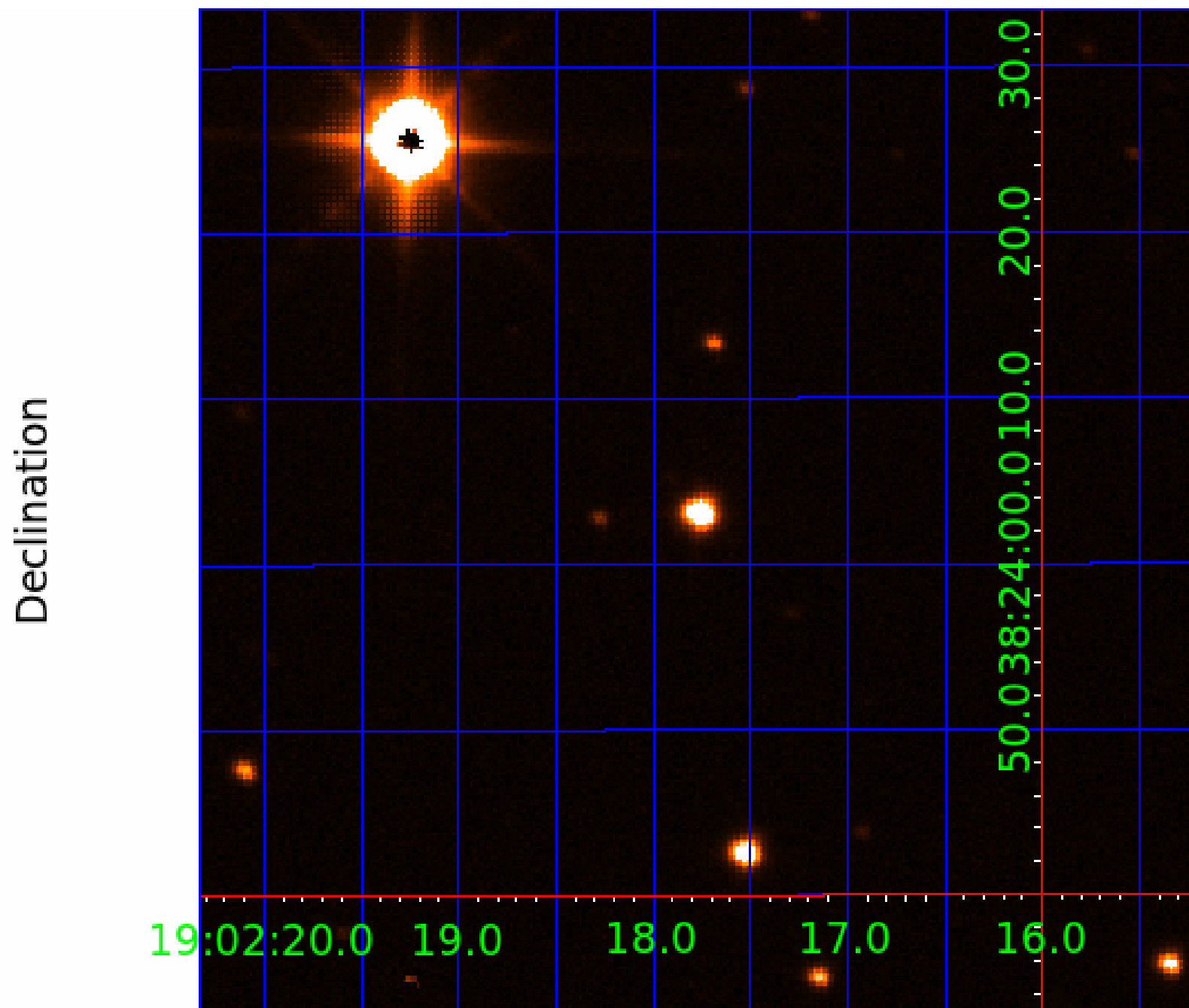


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.





UKIRT Image



# KIC 003323887

## Q1-17 DR25 TCE Parameters

TCE	Run Type	KOI?	Period (Days)	Epoch (BKJD)	Depth (ppm)	Duration (Hours)	MES	SNR	$R_{\star}$ ( $R_{\odot}$ )	$T_{\star}$ (K)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
003323887-01	OBS	No	19.222229	145.864428	5737.6	3.084	166.3	214.7	0.96	5779	8.07	45.31
003323887-02	OBS	0377.01	19.276130	143.884976	304.7	5.345	135.7	14.9	0.96	5779	2.01	45.14
003323887-03	OBS	No	39.065814	132.509654	345.1	5.247	100.7	12.3	0.96	5779	2.31	17.60
003323887-04	OBS	No	38.810860	137.239202	3974.5	4.500	84.2	-1.0	0.96	5779	5.96	17.76

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
003323887-01	OBS	FP	0.00	1	0	1	0	LPP_DV—HALO_GHOST
003323887-02	OBS	FP	0.00	1	0	0	0	LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
003323887-03	OBS	FP	0.01	1	0	0	0	MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
003323887-04	OBS	FP	0.00	1	0	1	0	LPP_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—CENT_NOFITS—HALO_GHOST

**Notes:** OBS = Observed. INJ = Injected. INV = Inverted. SCR = Scrambled.

N = Not Transit-Like. S = Stellar Eclipse. C = Centroid Offset. E = Ephemeris Match.

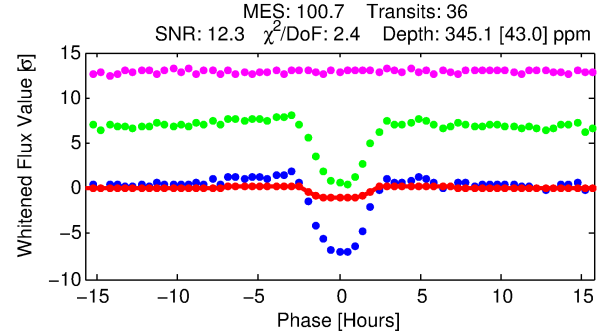
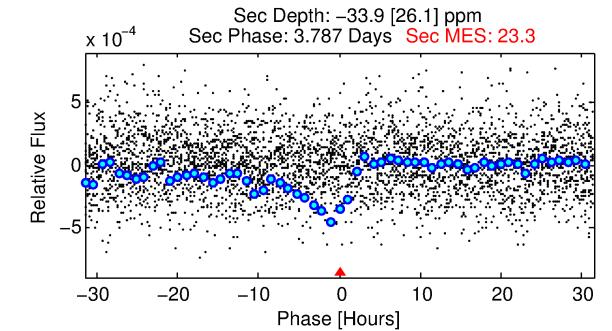
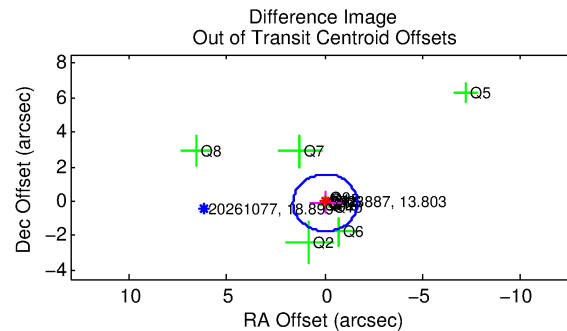
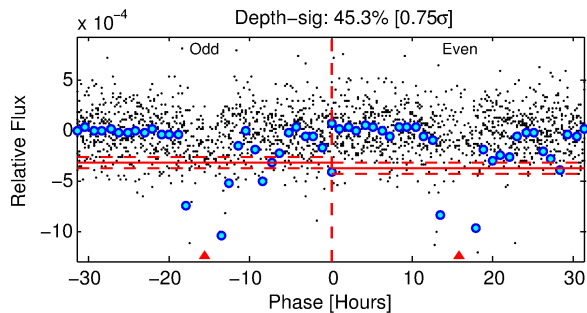
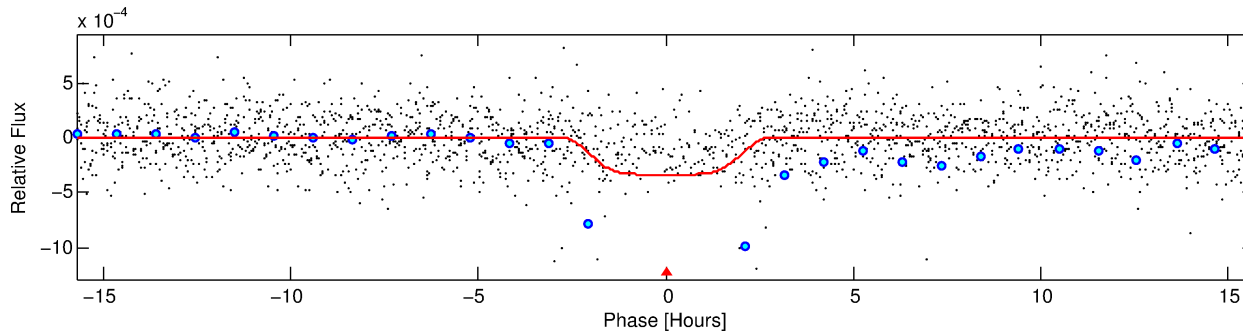
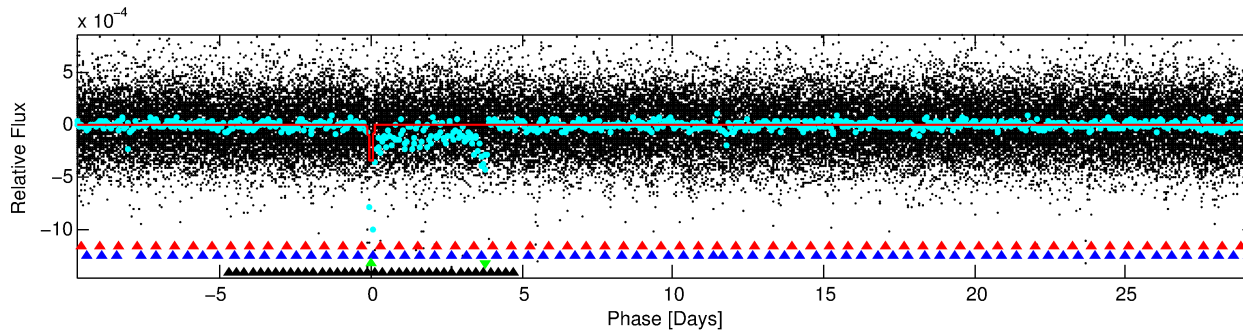
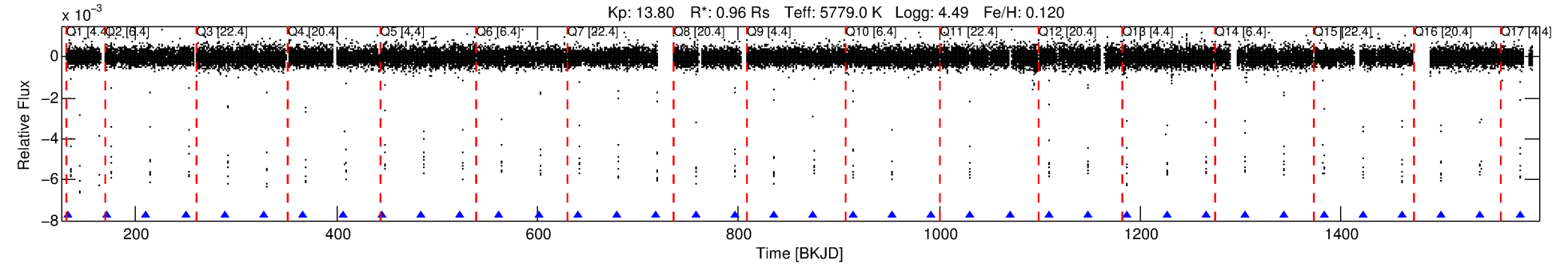
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 003323887-03

No Significant Match Found

# DV One-Page Summary

KIC: 3323887 Candidate: 3 of 4 Period: 39.066 d  
 KOI: K00377 Name: Kepler-9 Corr: No Ephemeris Match



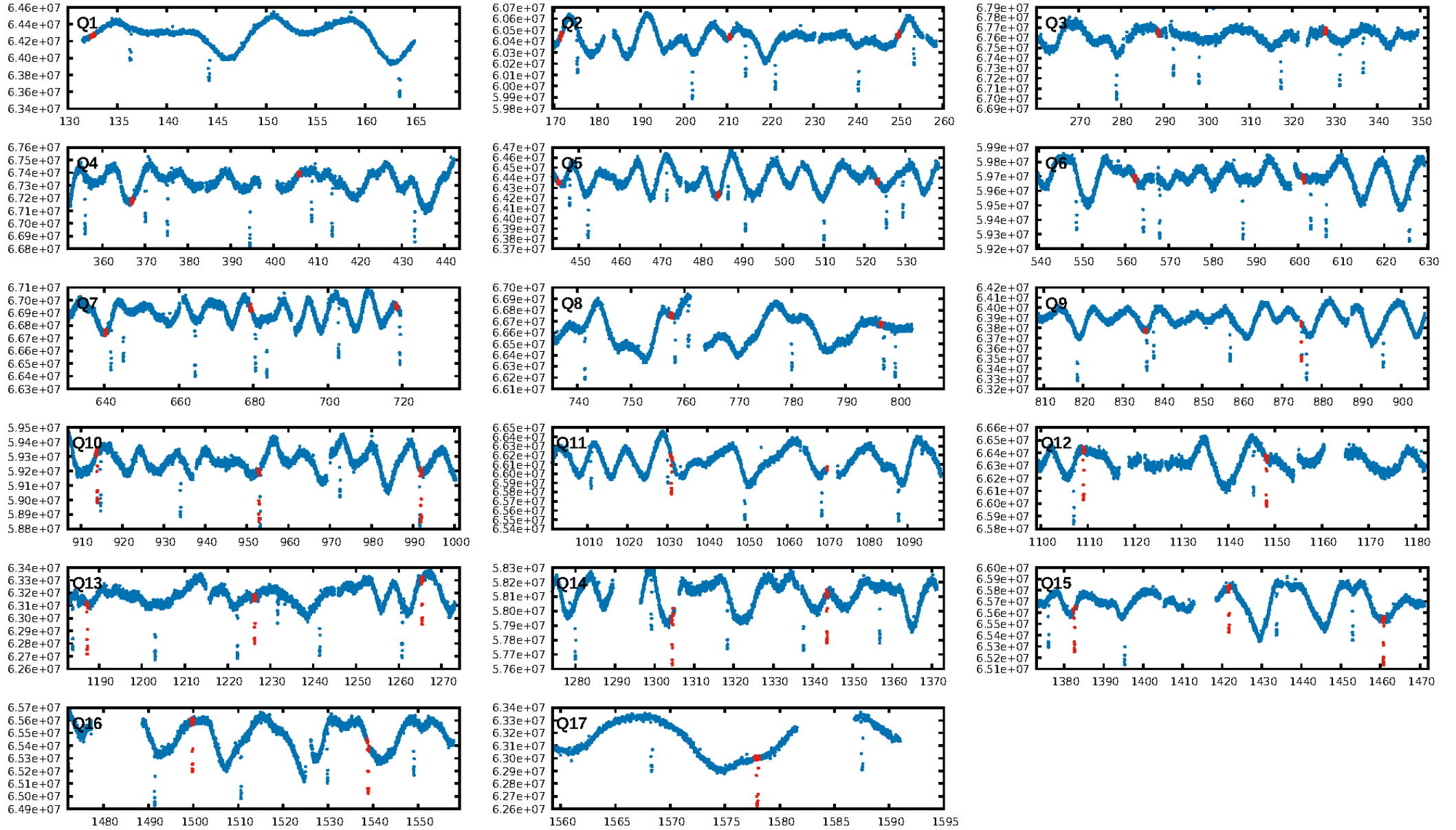
## DV Fit Results:

Period = 39.06581 [0.00048] d  
 Epoch = 132.5097 [0.0104] BKJD  
 Rp/R\* = 0.0222 [0.0020]  
 a/R\* = 19.85 [5.12]  
 b = 0.96 [0.02]  
 Seff = 17.60 [4.20]  
 Teq = 522 [31] K  
 Rp = 2.32 [0.41] Re  
 a = 0.2278 [0.0323] AU  
 Ag = N/A  
 Tefp = N/A

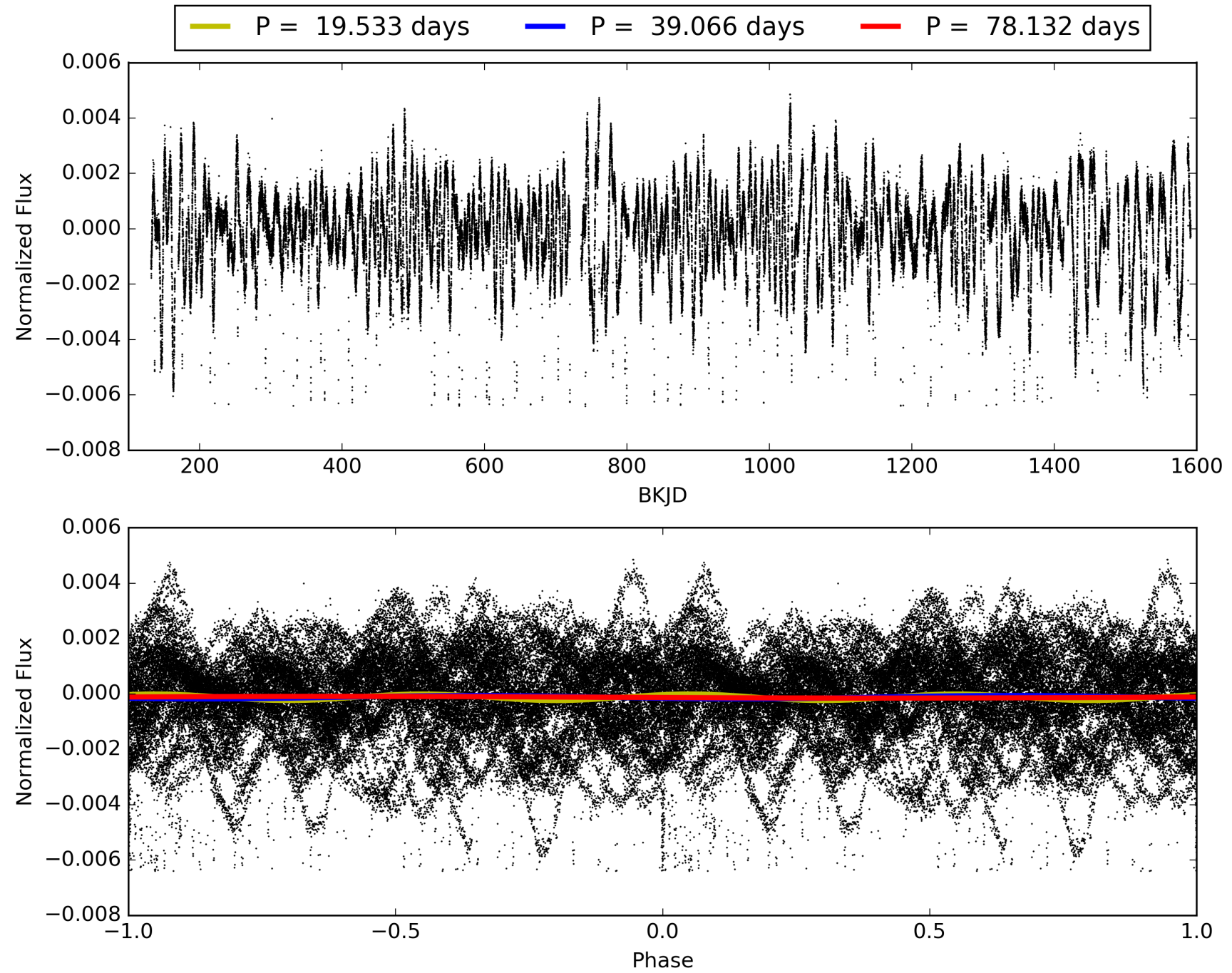
## DV Diagnostic Results:

ShortPeriod-sig: 62.4% [0.89 $\sigma$ ]  
 LongPeriod-sig: N/A  
 ModelChiSquare2-sig: 0.0%  
 ModelChiSquareGof-sig: 82.9%  
 Bootstrap-pfa: N/A  
 RollingBand-fgt: 1.00 [34/34]  
 GhostDiagnostic-chr: 0.7514  
 Centroid-sig: 0.0%  
 Centroid-so: 1.636 arcsec [2.84 $\sigma$ ]  
 OotOffset-rm: 0.091 arcsec [0.17 $\sigma$ ]  
 KicOffset-rm: 0.172 arcsec [0.28 $\sigma$ ]  
 OotOffset-st: 4/3/3/4 [14]  
 KicOffset-st: 4/3/3/4 [14]  
 DiffImageQuality-fgm: 0.57 [8/14]  
 DiffImageOverlap-fno: 0.82 [14/17]

# TCE 00323887-03, PDC Light Curves

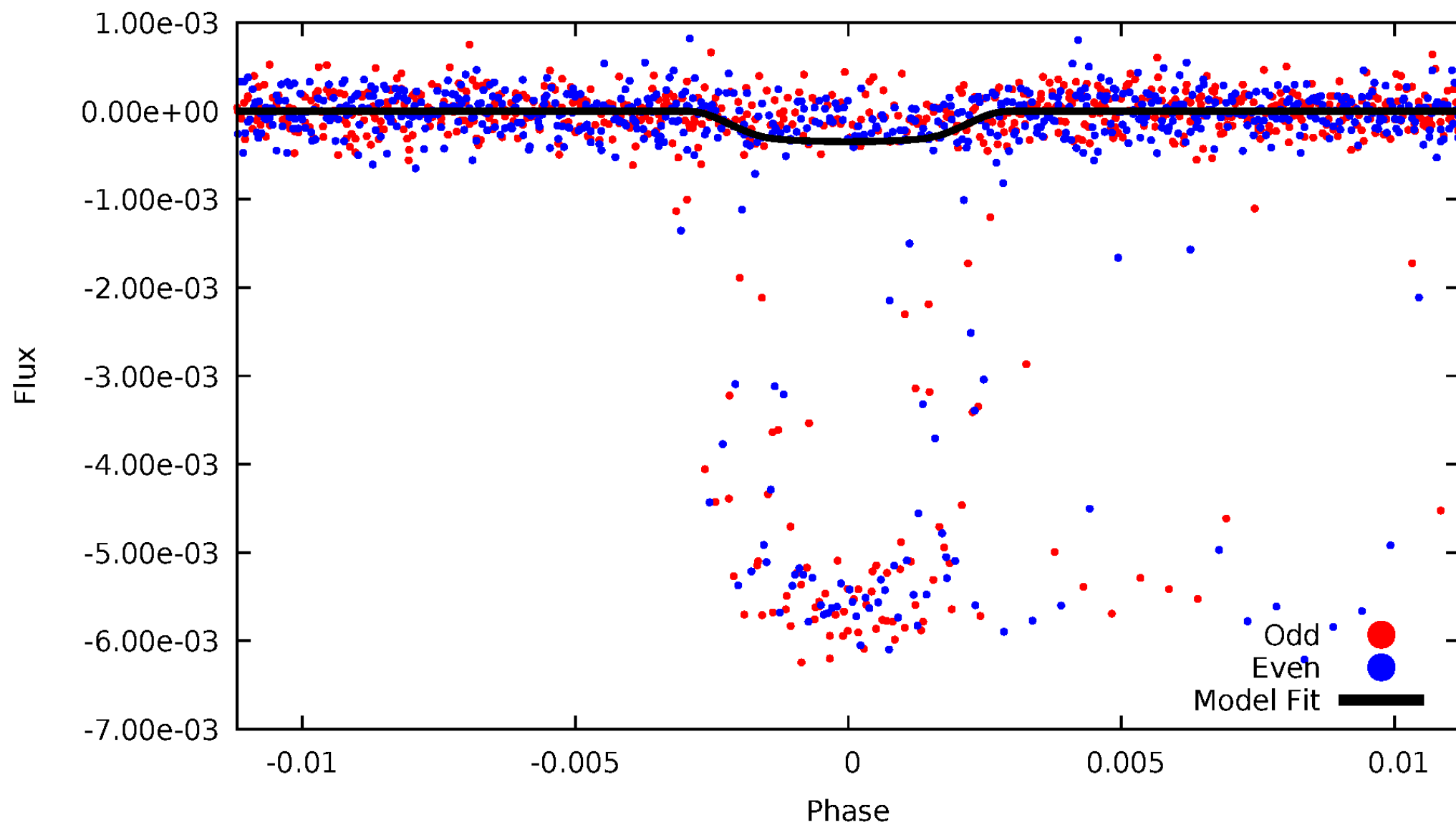


TCE 003323887-03



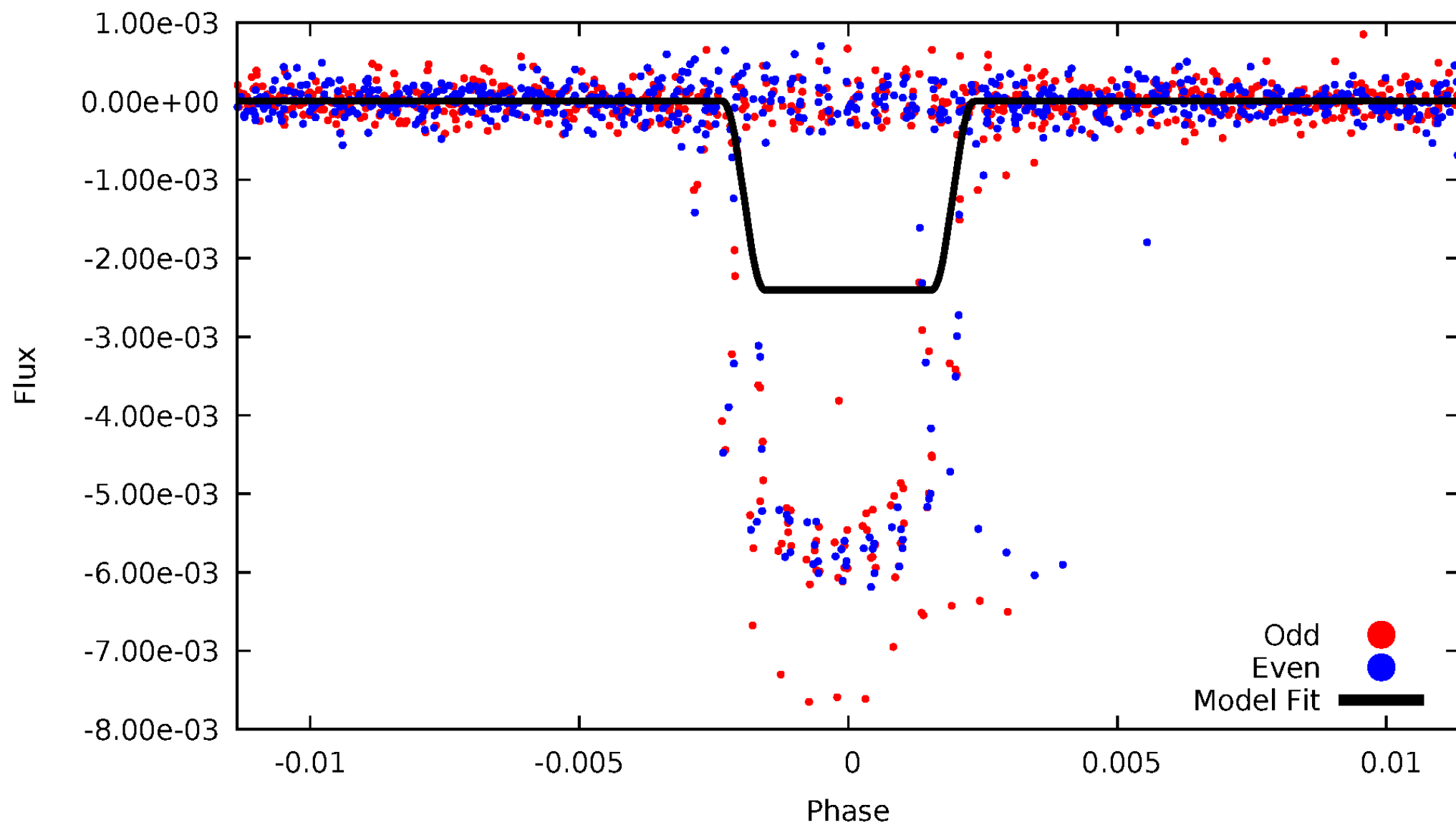
# DV Odd/Even

TCE 003323887-03



# ALT Odd/Even

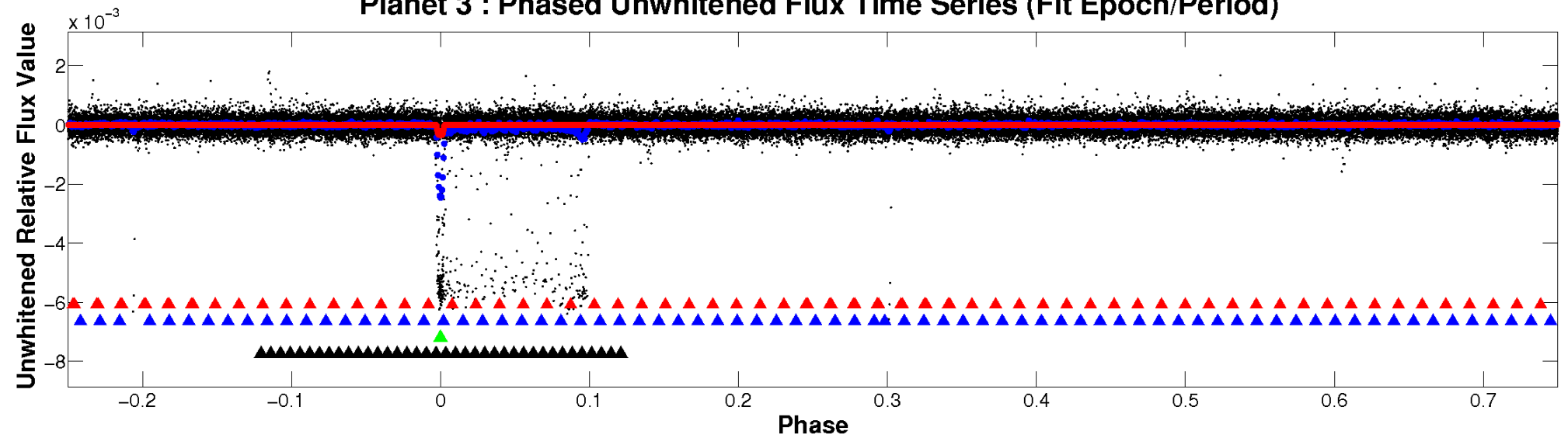
TCE 003323887-03



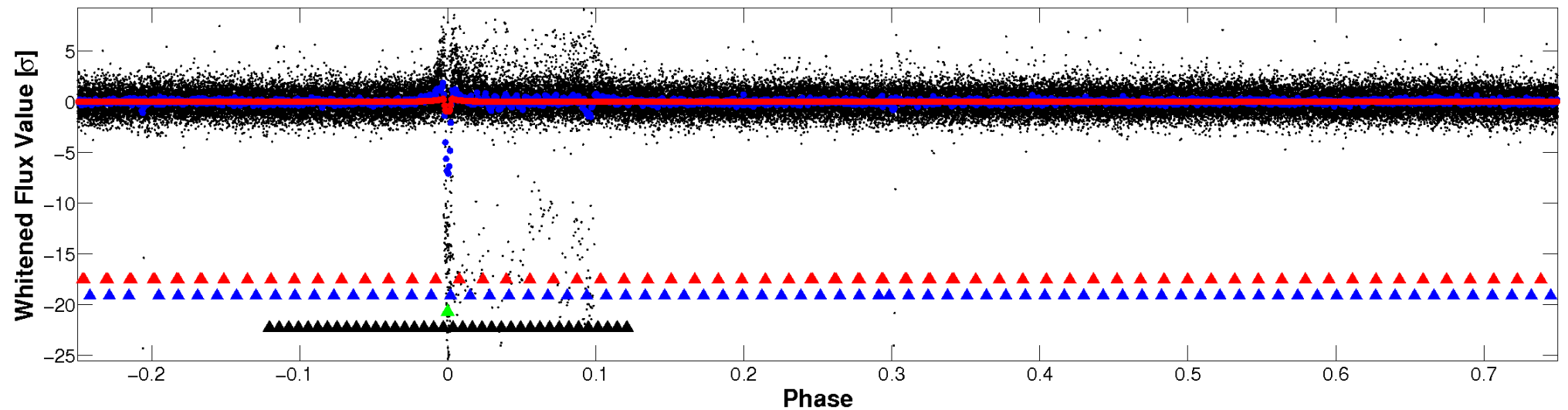


# Non-Whitened Vs. Whitened Light Curve

## Planet 3 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)

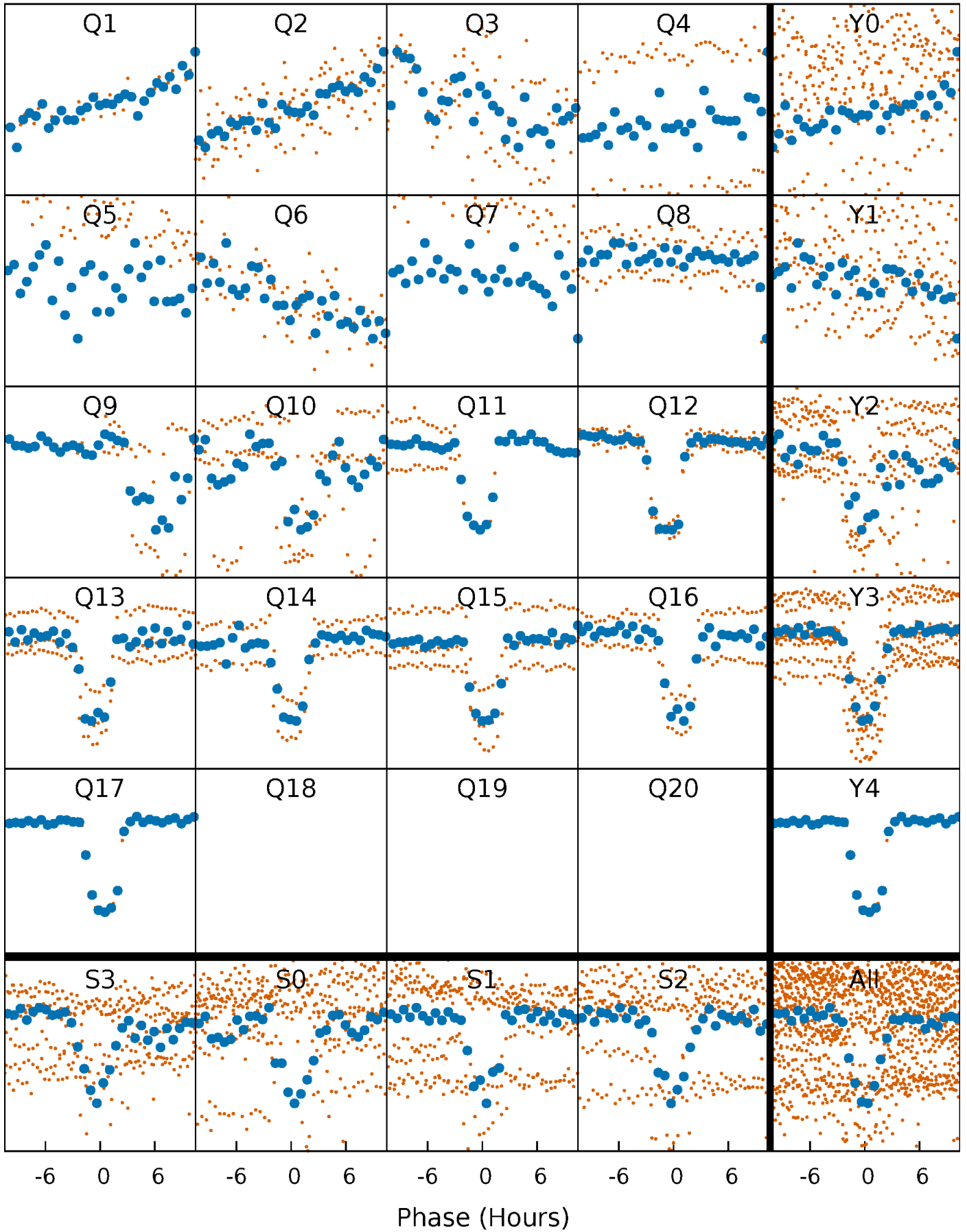


## Planet 3 : Phased Whitened Flux Time Series (Fit Epoch/Period)



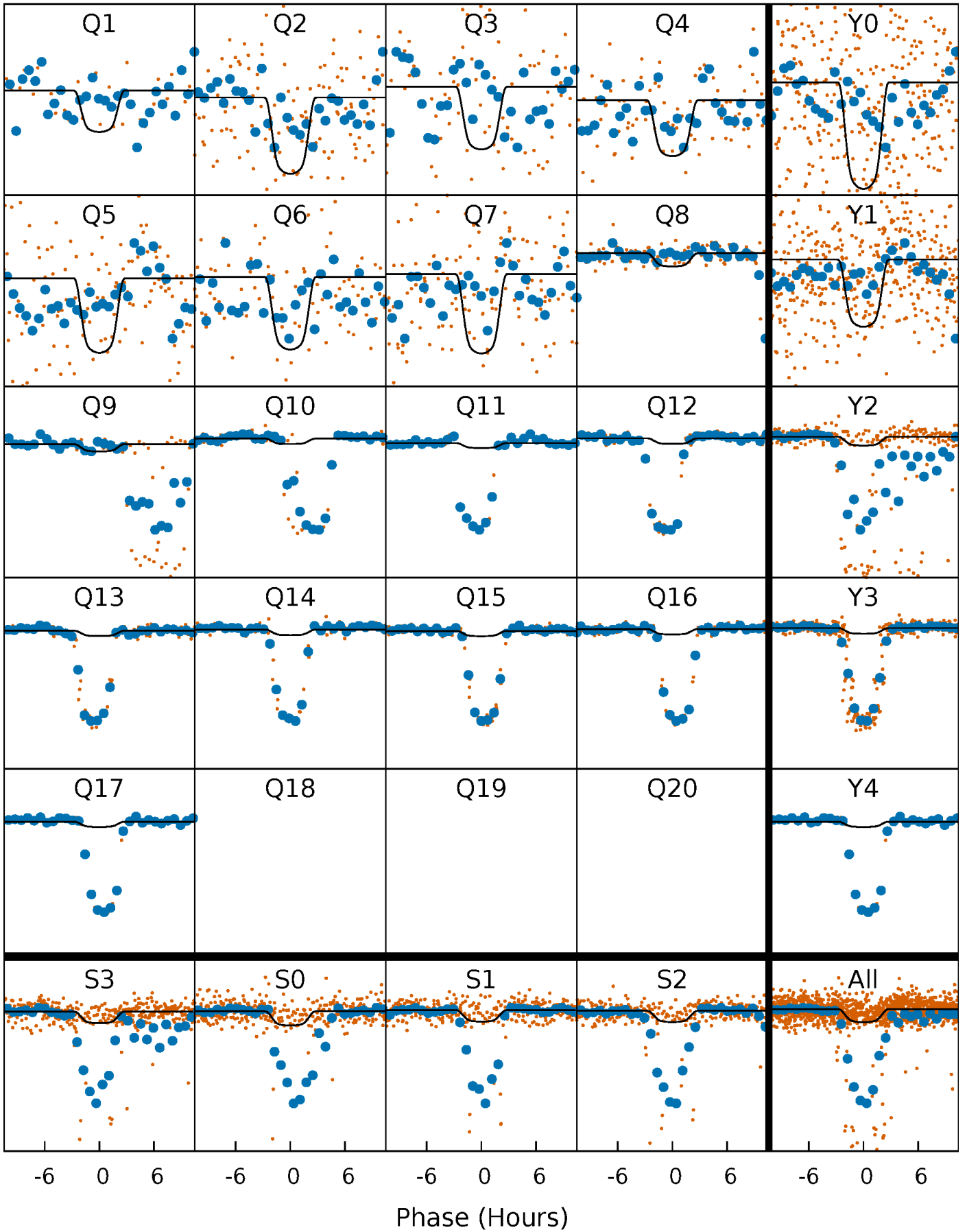
# PDC Quarter-Phased Transit Curves

TCE 003323887-03   P= 39.065814 Days    $T_0=132.509654$  (BKJD)



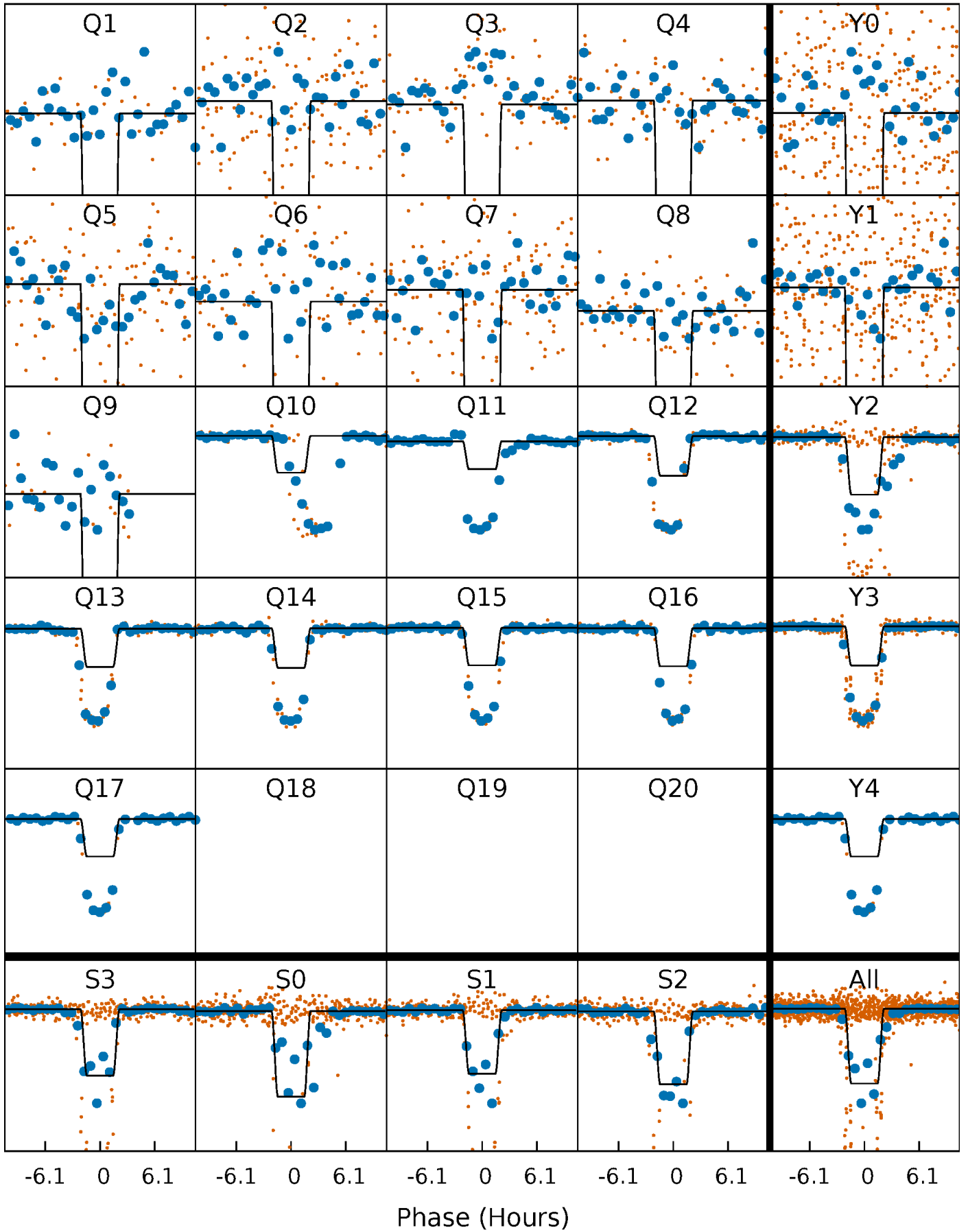
# DV Quarter-Phased Transit Curves

TCE 003323887-03   P= 39.065814 Days    $T_0=132.509654$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

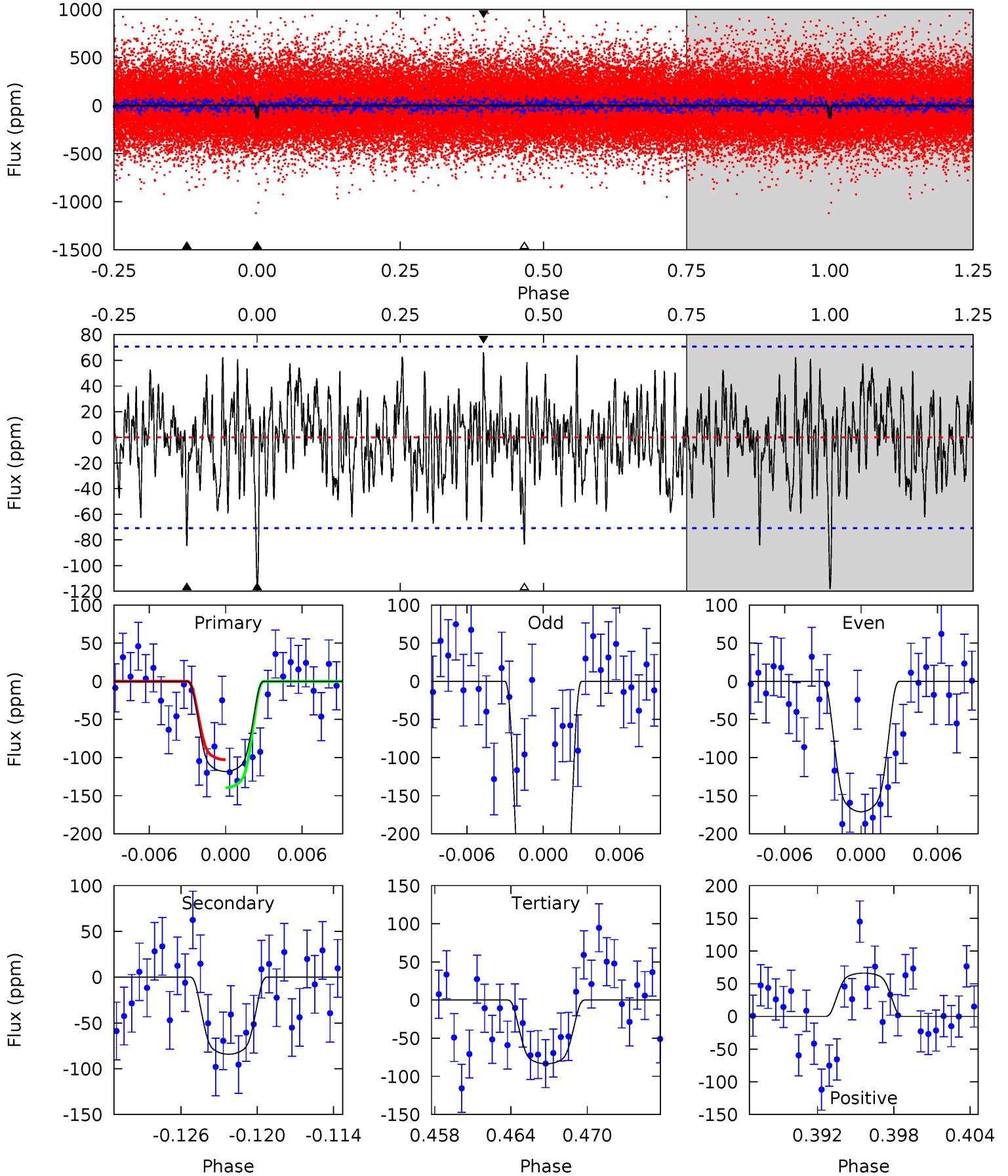
TCE 003323887-03 P= 39.068426 Days  $T_0=132.433478$  (BKJD)



# DV Model-Shift Uniqueness Test

003323887-03, P = 39.065814 Days, E = 93.443840 Days

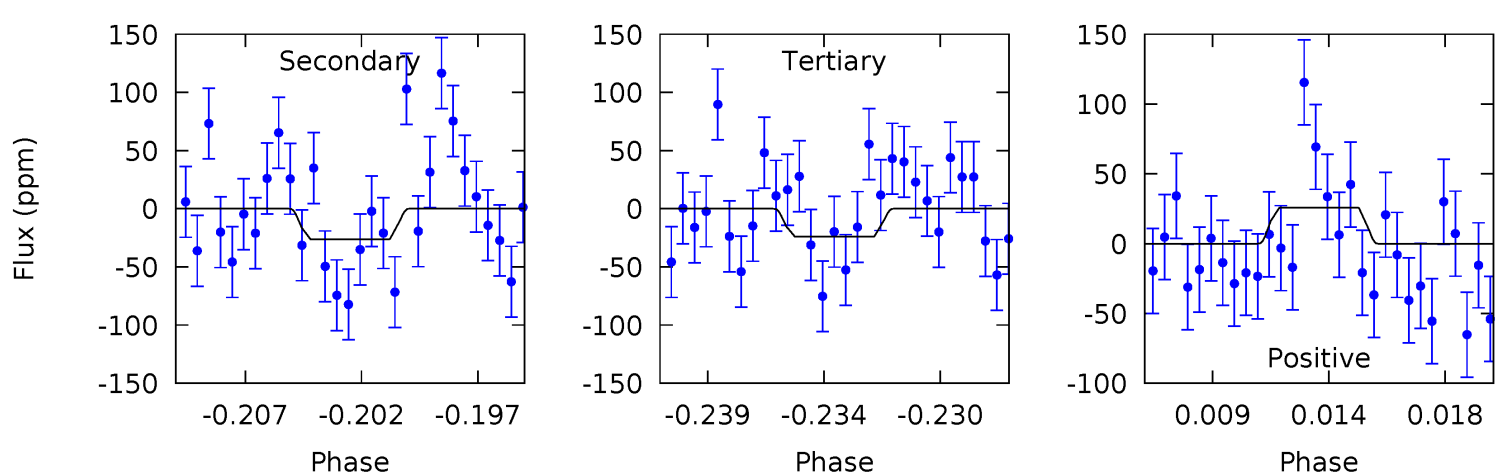
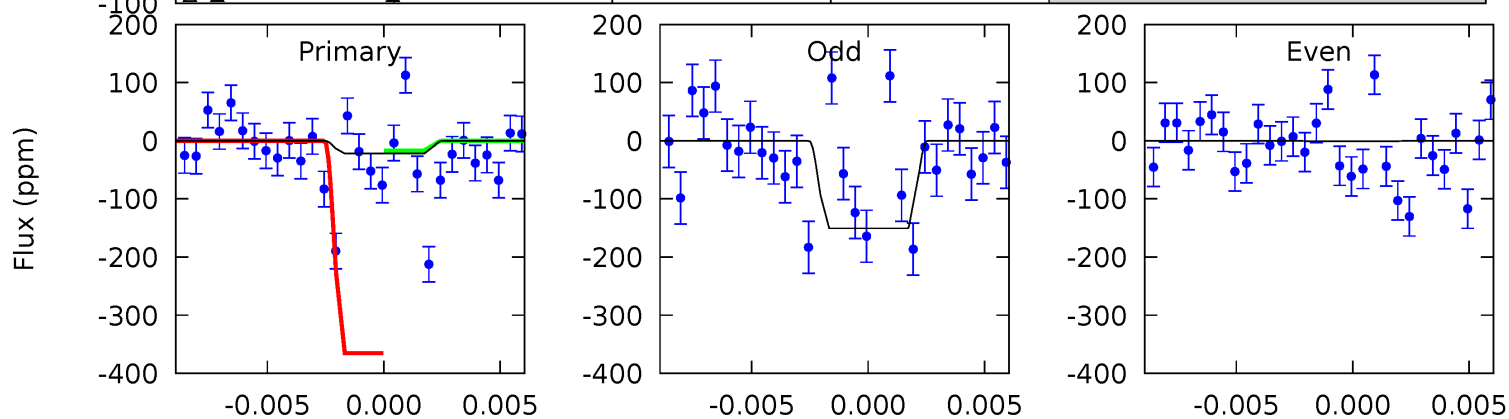
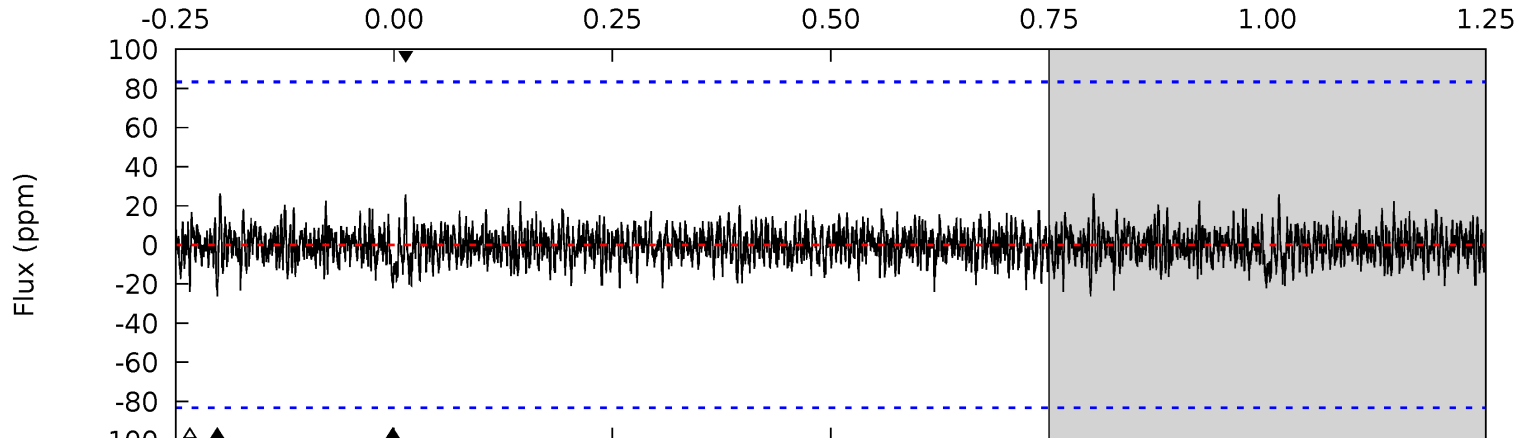
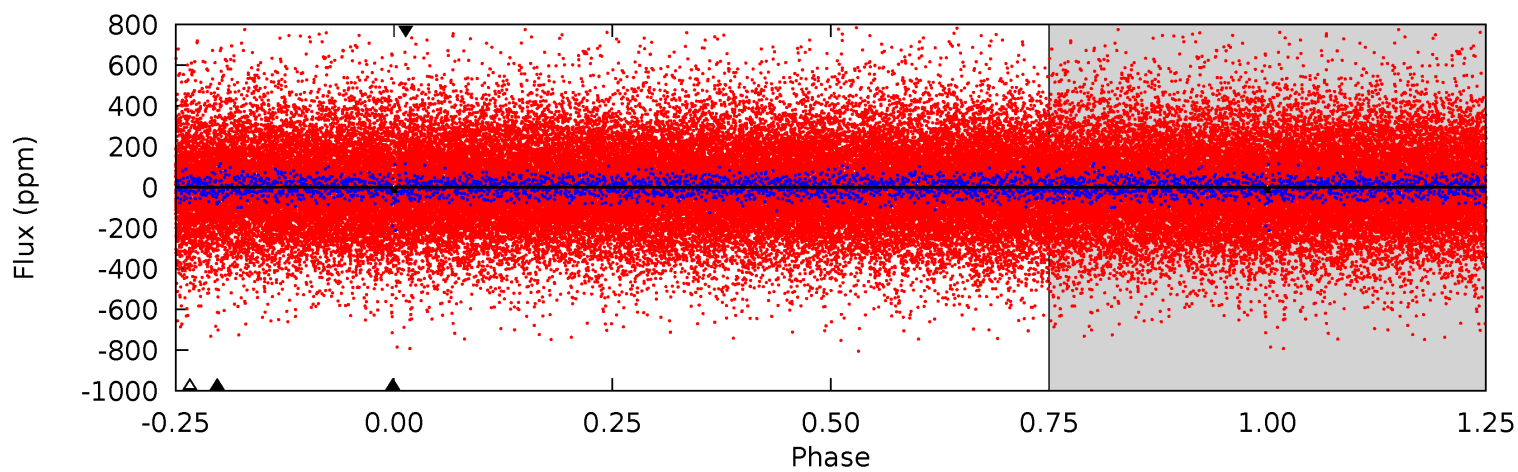
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
8.56	6.10	6.05	4.80	5.12	2.75	1.80	2.51	3.77	0.05	1.30	11.1	9.49	0.36	1.33



# Alt Model-Shift Uniqueness Test

003323887-03, P = 39.068426 Days, E = 93.365052 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
1.37	1.63	1.49	1.61	5.17	2.83	0.44	-0.12	-0.24	0.14	0.02	4.60	15.7	0.50	0



### Stellar Parameters For KIC 003323887

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5779^{+104}_{-127}$	$4.491^{+0.030}_{-0.128}$	$0.120^{+0.150}_{-0.150}$	$0.956^{+0.147}_{-0.053}$	$1.034^{+0.058}_{-0.080}$	$1.665^{+0.245}_{-0.561}$
	+2%/-2%	+1%/-3%	+125%/-125%	+15%/-6%	+6%/-8%	+15%/-34%
Source	SPE24	SPE24	SPE24	DSEP		

KIC = Kepler Input Catalog; PHO = Photometry; SPE = Spectroscopy; AST = Asteroseismology  
 TRA = Transits; DESP = Dartmouth Models; MULT = Multiple Models

### Secondary Eclipse Parameters for KIC 003323887-03 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-84 \pm 14$	$2.39^{+0.30}_{-0.25}$	$739^{+31}_{-23}$	$4000^{+204}_{-167}$	$412^{+129}_{-105}$
Alt.	$-26 \pm 16$	$5.24^{+0.48}_{-0.36}$	$739^{+31}_{-23}$	$2666^{+160}_{-296}$	$27^{+16}_{-17}$

$T_{max}$  = Theoretical Maximum Planetary Temperature

$T_{obs}$  = Observed Planetary Temperature (Assuming A=0.3)

$A_{obs}$  = Observed Albedo (Assuming T=0)

If a secondary eclipse is present, the system is likely an EB if  $T_{obs} \gg T_{max}$  AND  $A_{obs} \gg 1.0$



## DV Centroid Data

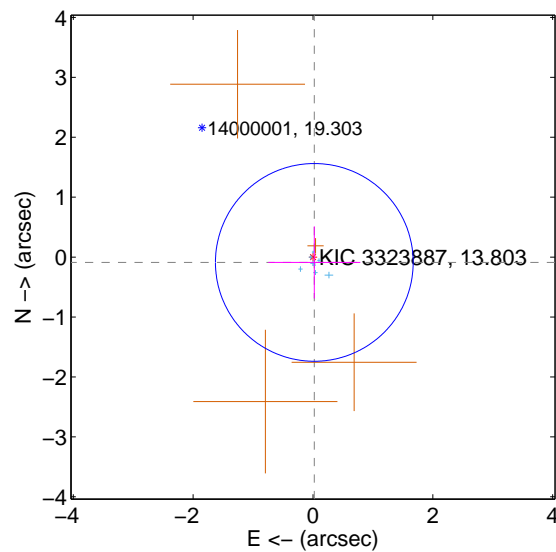
Supplemental centroid analysis for 003323887-03. Kepler magnitude: 13.80. Transit SNR 12.32

There are 8 quarters with good PRF difference image offsets

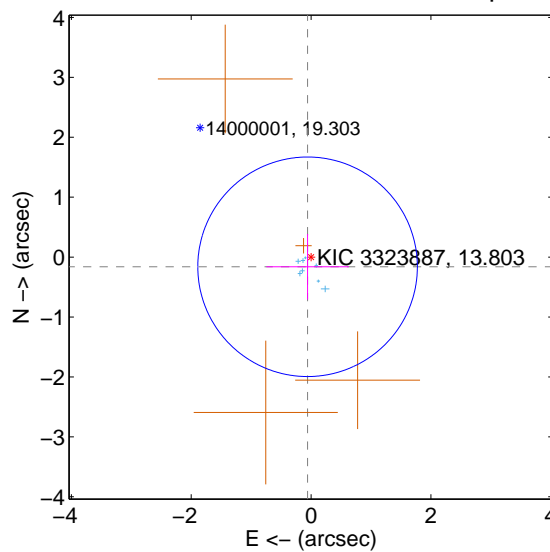
The direct PRF centroid is offset from the target star catalog position by about 0.22 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.091 \pm 0.550$	0.17	$-0.022 \pm 0.767$	$-0.088 \pm 0.602$
PRF-fit source offset from KIC position	$0.172 \pm 0.611$	0.28	$0.058 \pm 0.689$	$-0.162 \pm 0.547$
photometric centroid source offset	$1.64 \pm 0.58$	2.84	$0.16 \pm 0.52$	$-1.63 \pm 0.58$

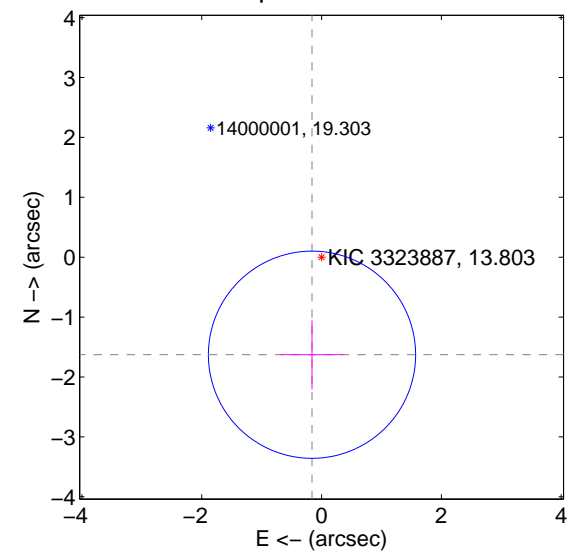
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

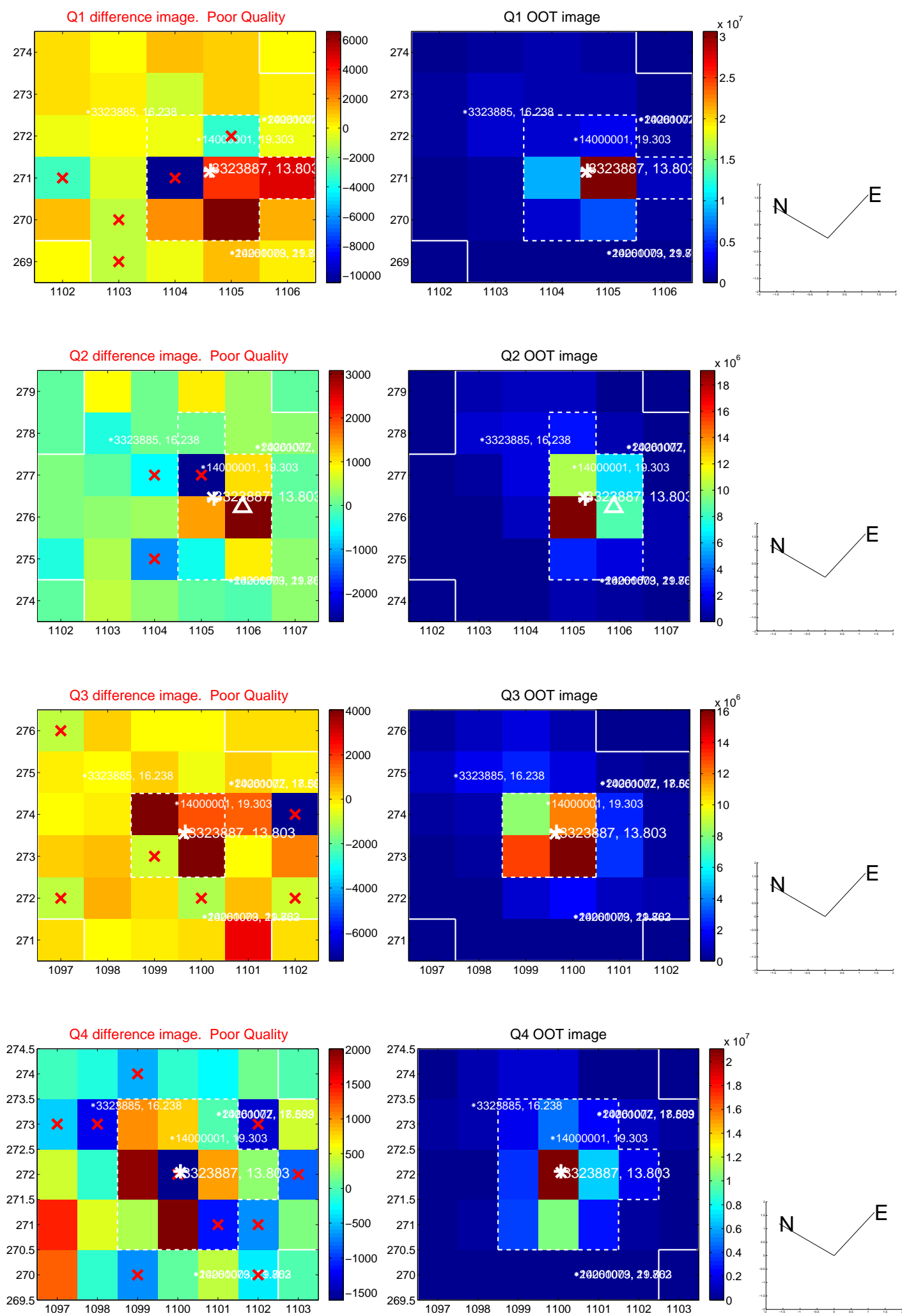


offset from photometric centroids

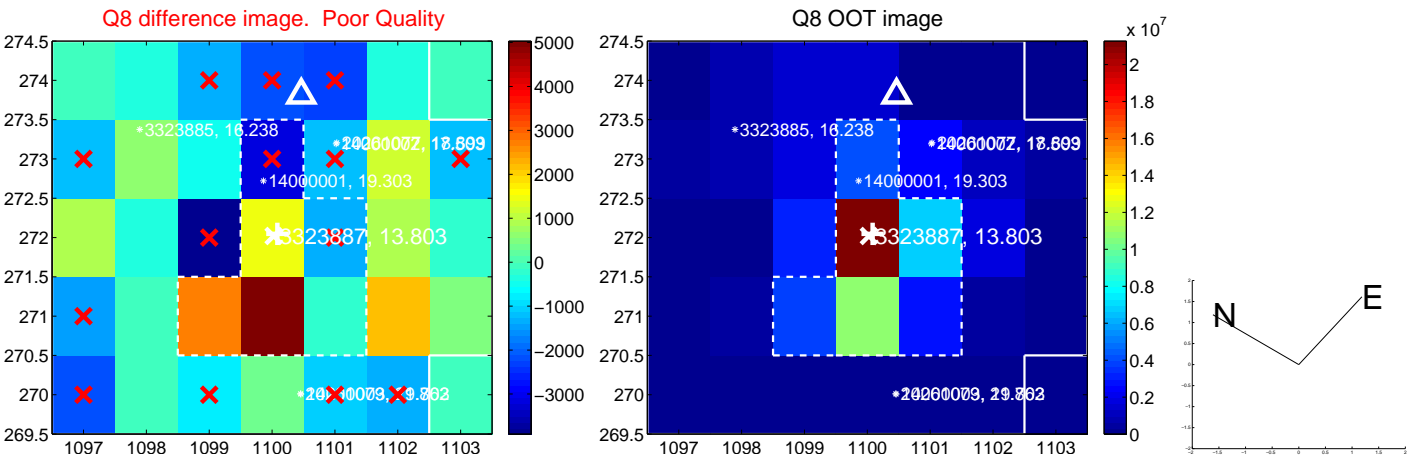
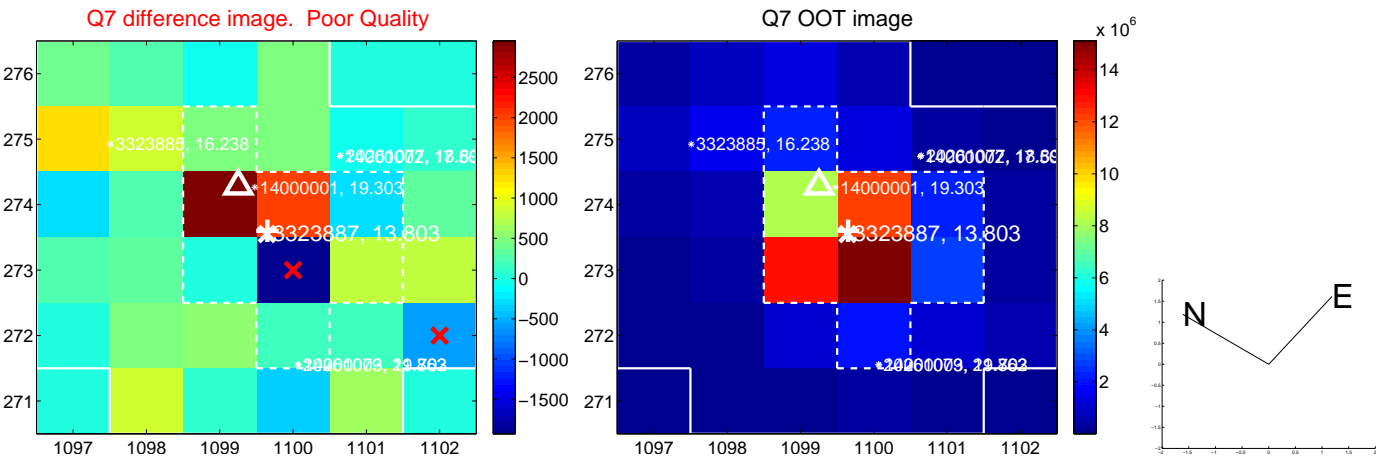
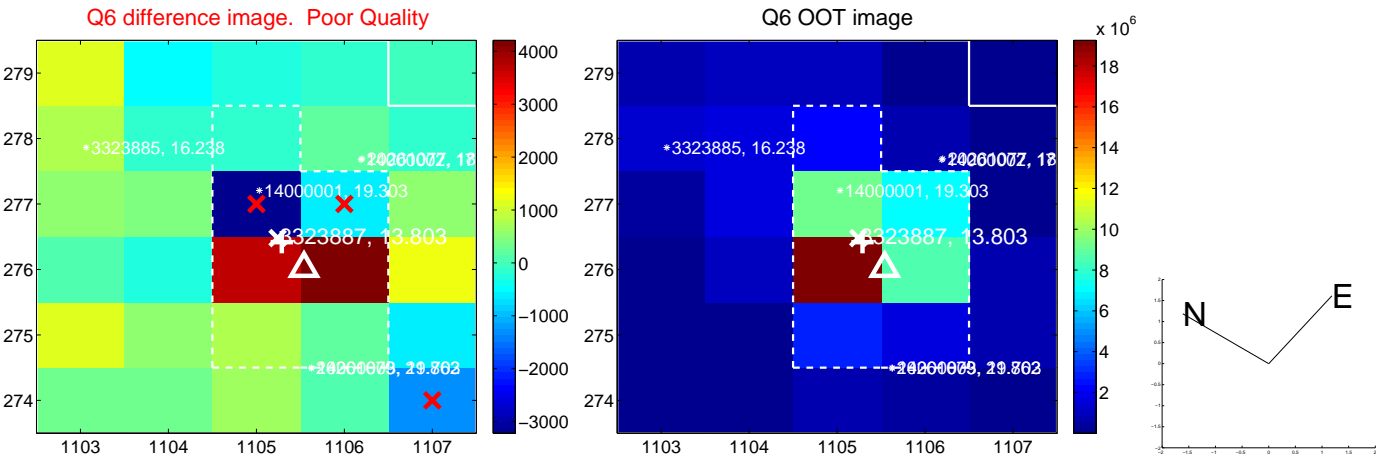
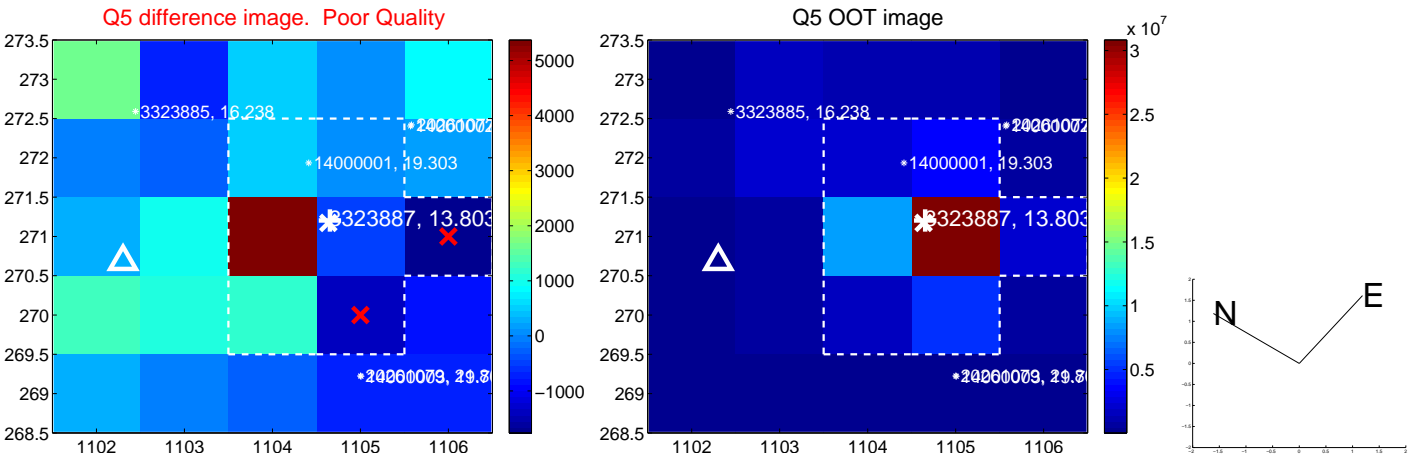


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three- $\sigma$ . Red \*: target star. Blue \*: Other stars. Text next to a star gives its KIC ID and kepmag. KIC IDs > 15,000,000 are from the UKIRT catalog.

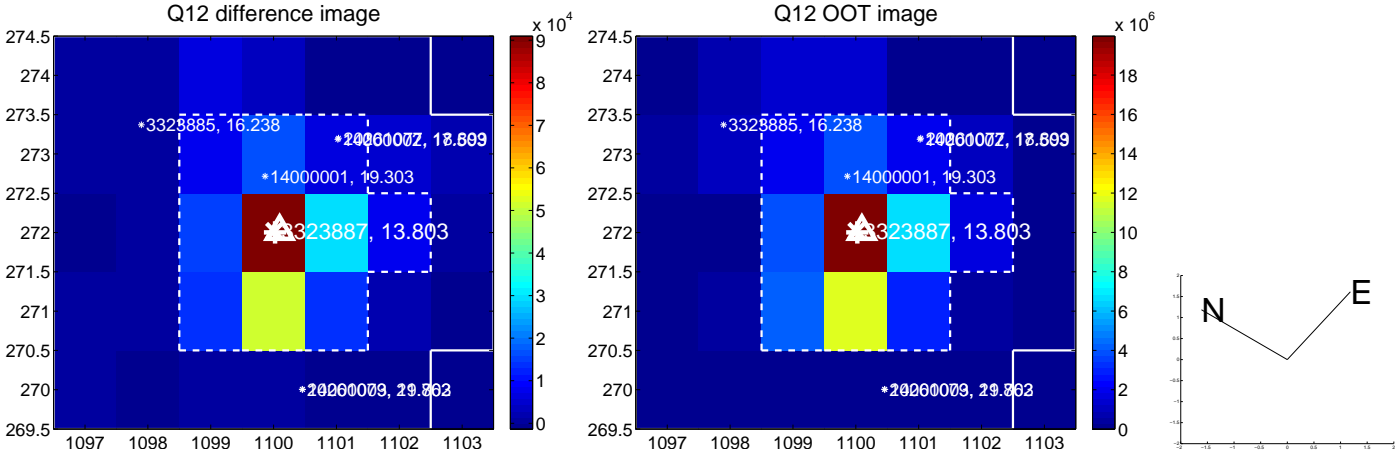
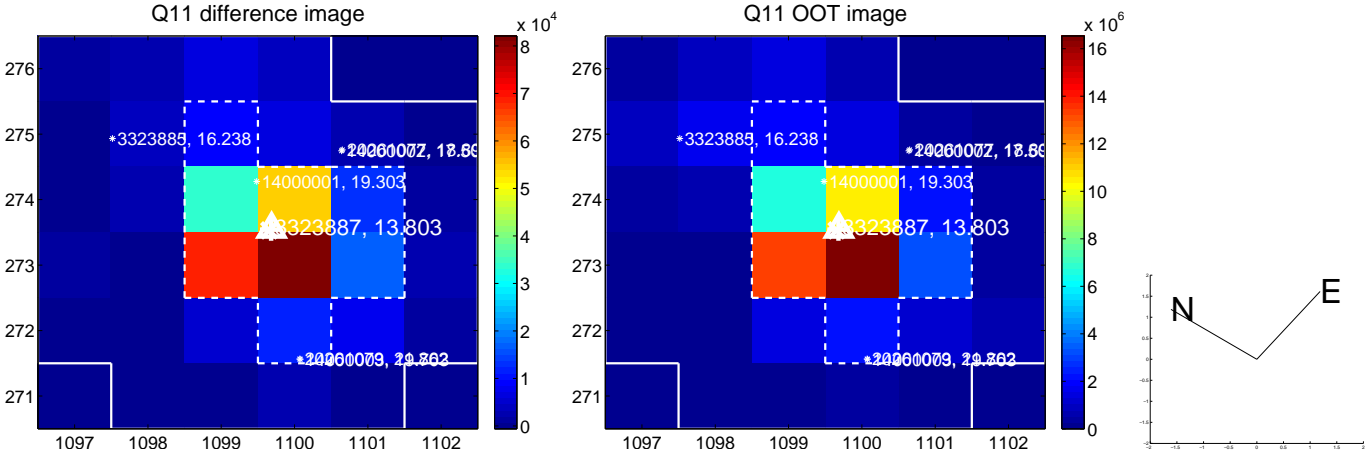
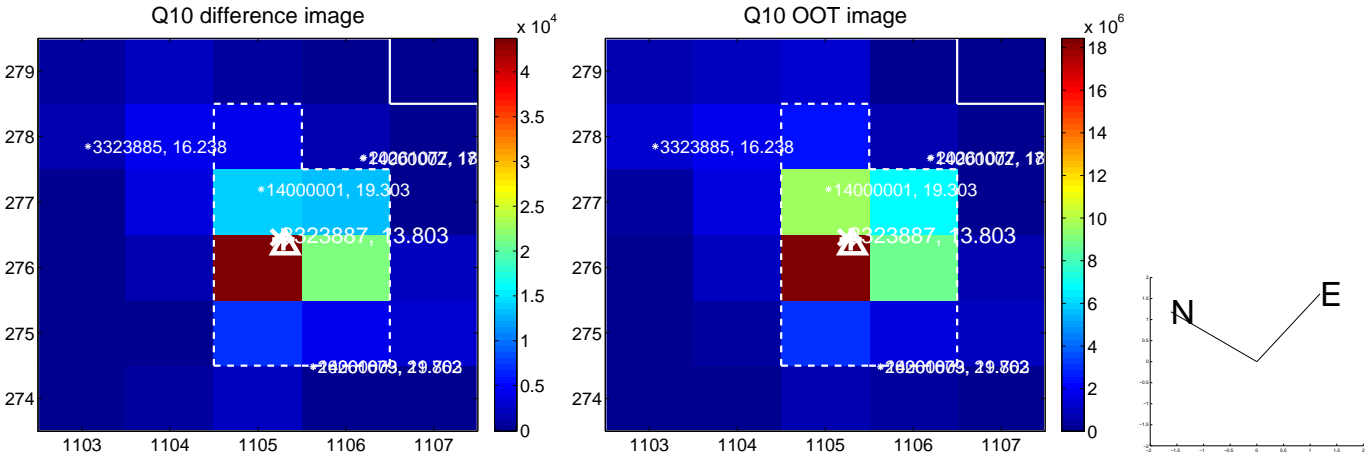
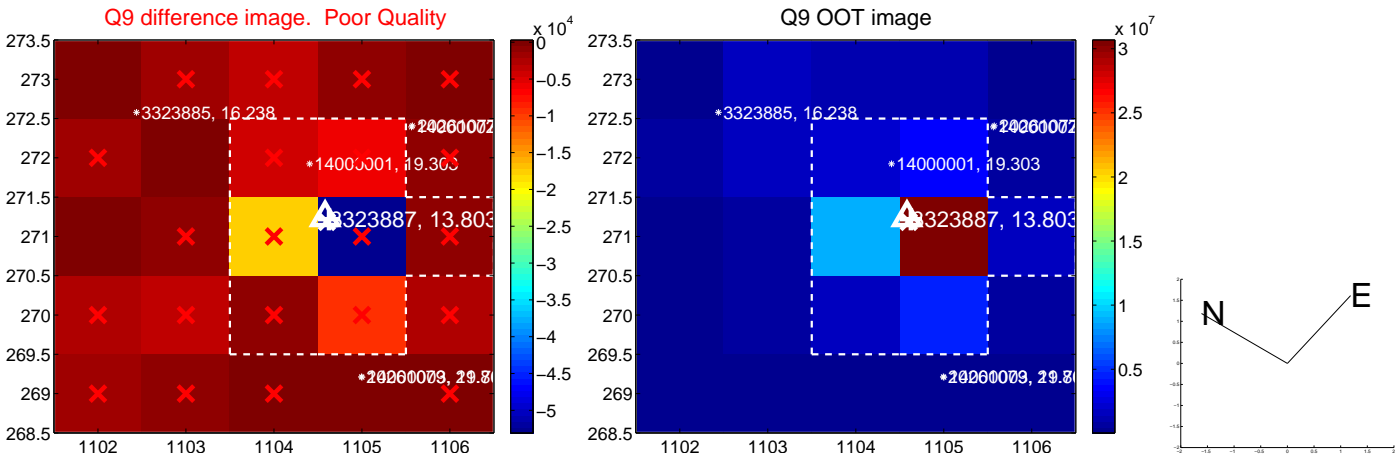
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



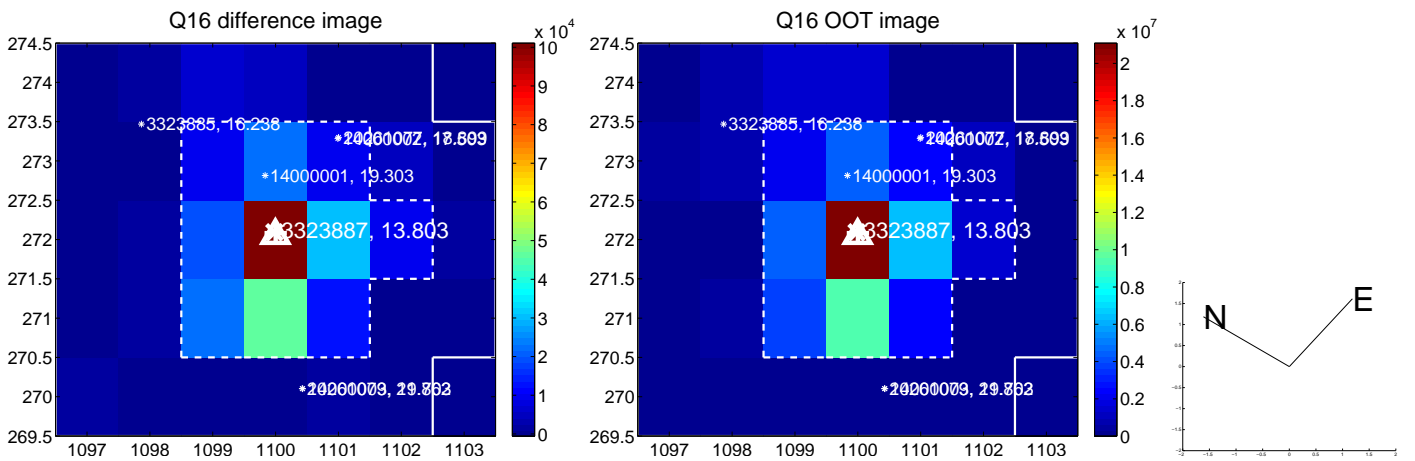
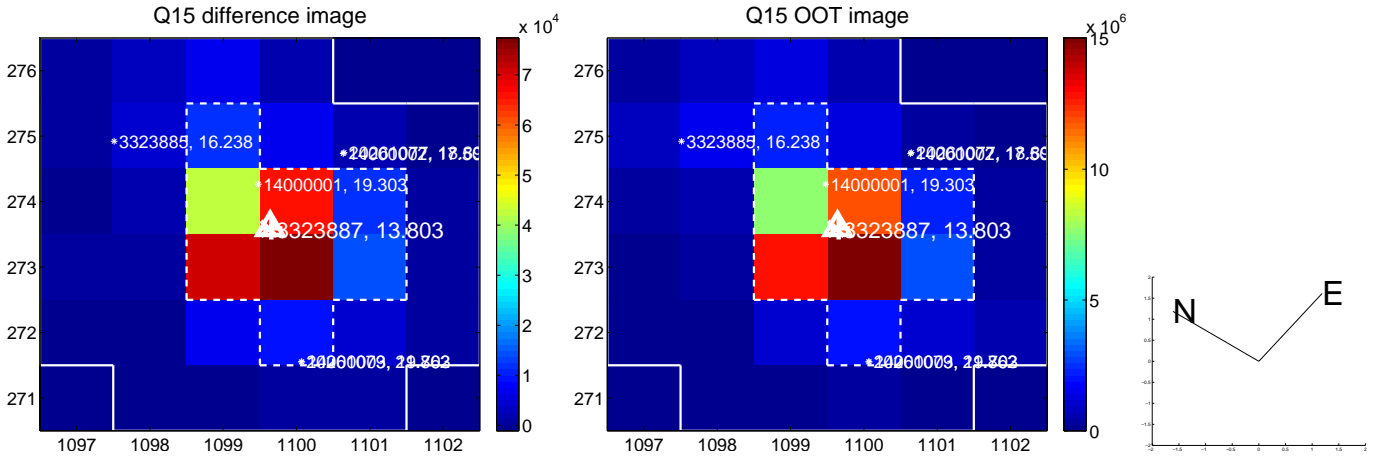
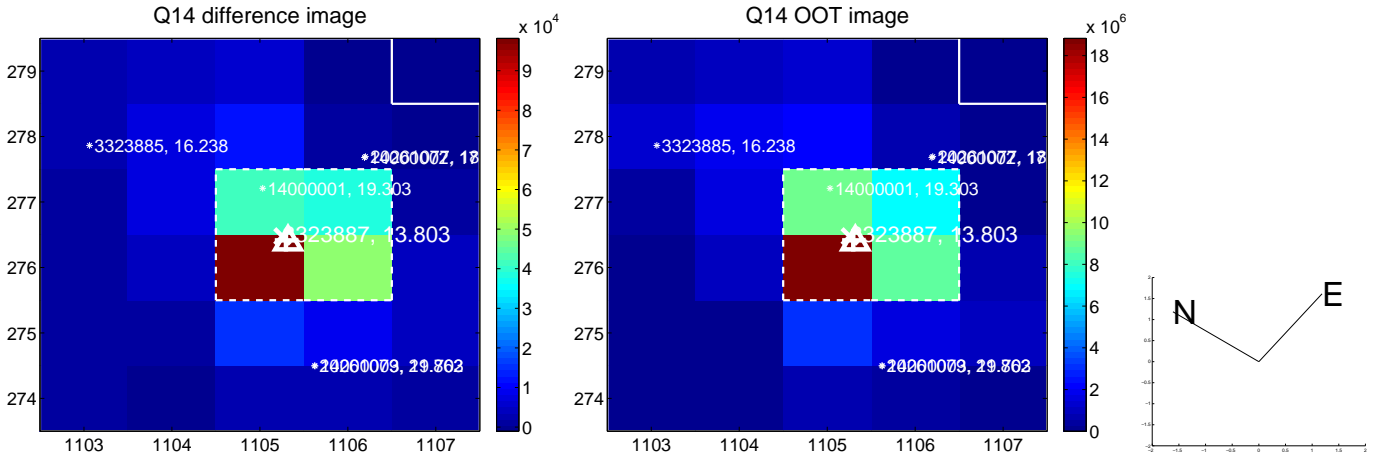
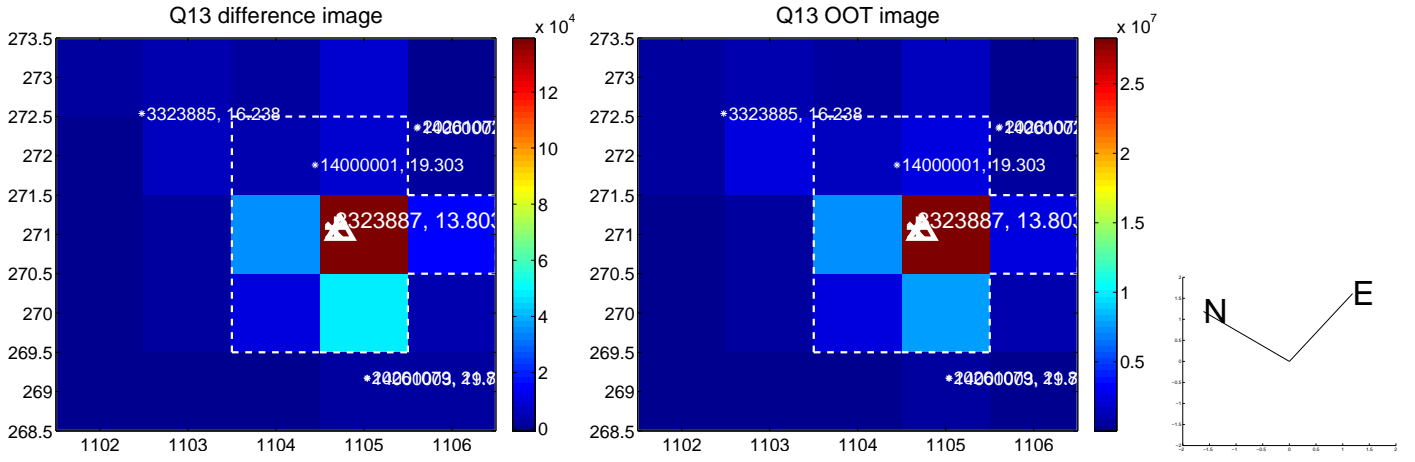
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



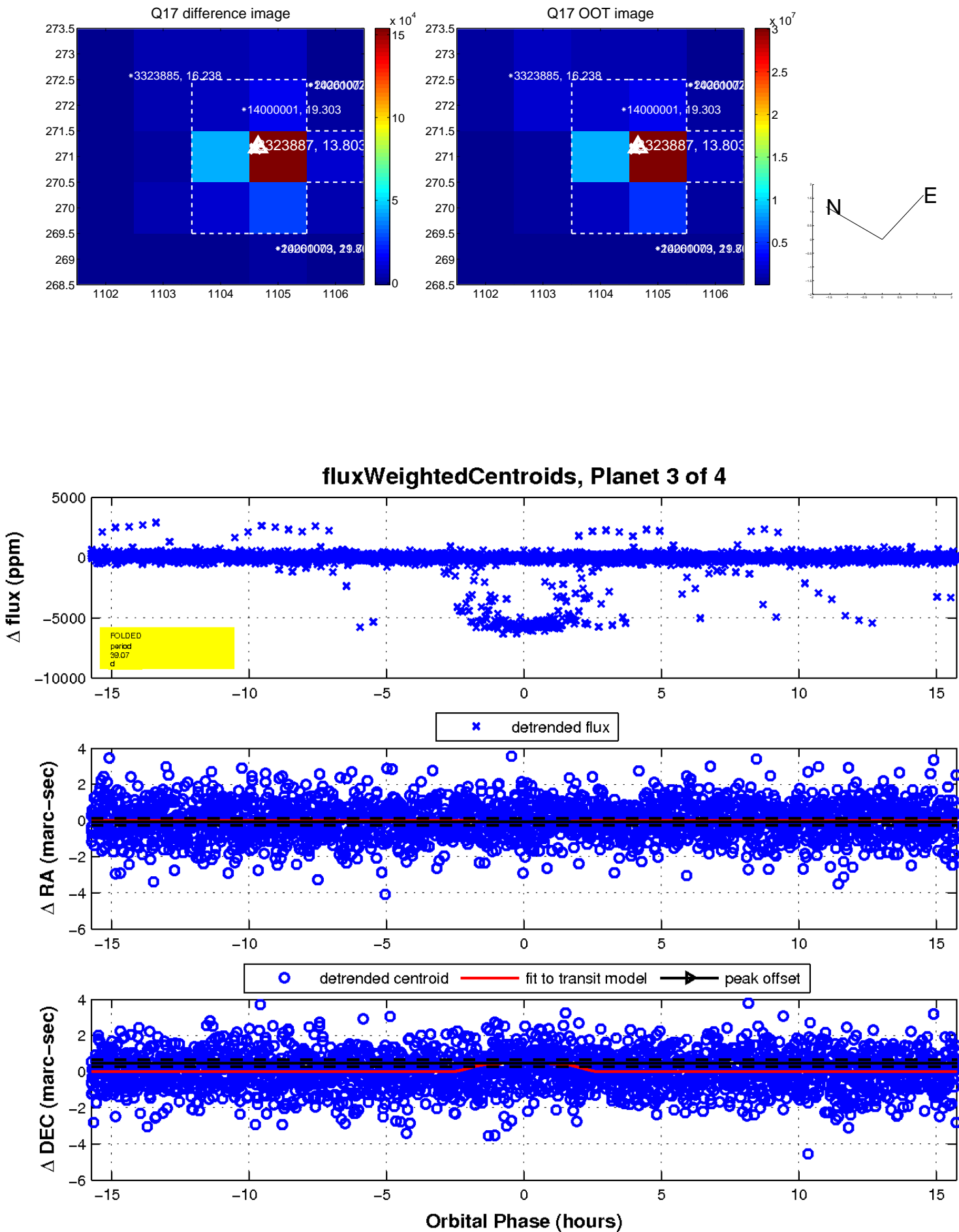
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



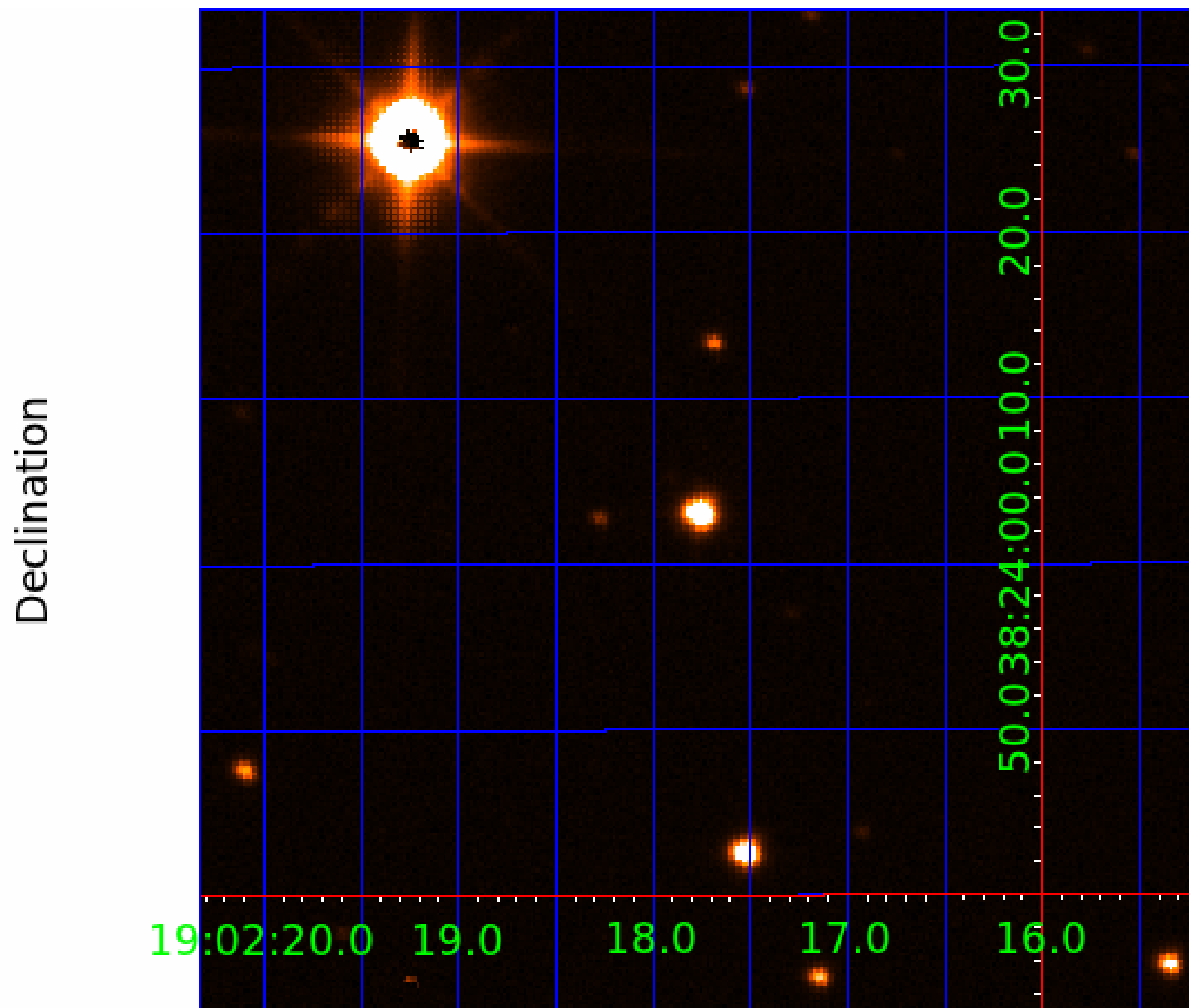
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image



# KIC 003323887

## Q1-17 DR25 TCE Parameters

TCE	Run Type	KOI?	Period (Days)	Epoch (BKJD)	Depth (ppm)	Duration (Hours)	MES	SNR	$R_{\star}$ ( $R_{\odot}$ )	$T_{\star}$ (K)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
003323887-01	OBS	No	19.222229	145.864428	5737.6	3.084	166.3	214.7	0.96	5779	8.07	45.31
003323887-02	OBS	0377.01	19.276130	143.884976	304.7	5.345	135.7	14.9	0.96	5779	2.01	45.14
003323887-03	OBS	No	39.065814	132.509654	345.1	5.247	100.7	12.3	0.96	5779	2.31	17.60
003323887-04	OBS	No	38.810860	137.239202	3974.5	4.500	84.2	-1.0	0.96	5779	5.96	17.76

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
003323887-01	OBS	FP	0.00	1	0	1	0	LPP_DV—HALO_GHOST
003323887-02	OBS	FP	0.00	1	0	0	0	LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
003323887-03	OBS	FP	0.01	1	0	0	0	MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
003323887-04	OBS	FP	0.00	1	0	1	0	LPP_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—CENT_NOFITS—HALO_GHOST

**Notes:** OBS = Observed. INJ = Injected. INV = Inverted. SCR = Scrambled.

N = Not Transit-Like. S = Stellar Eclipse. C = Centroid Offset. E = Ephemeris Match.

See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

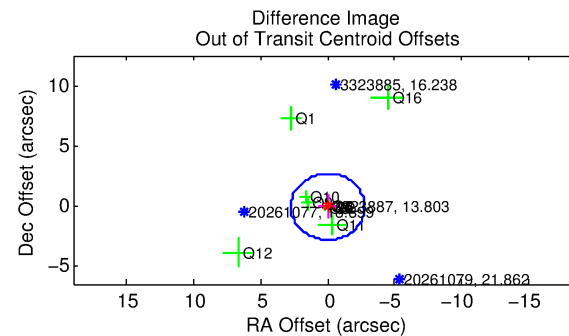
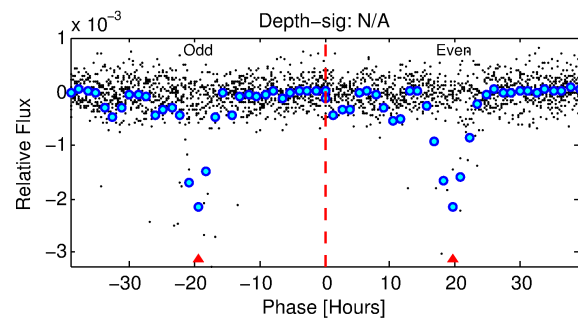
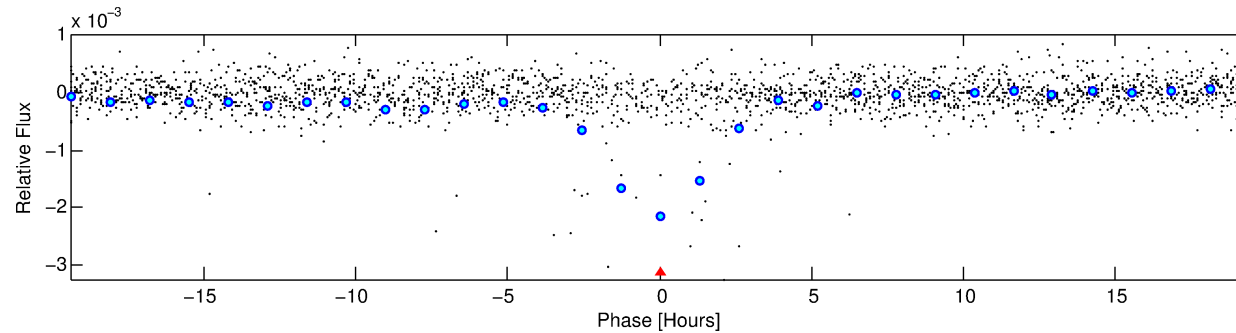
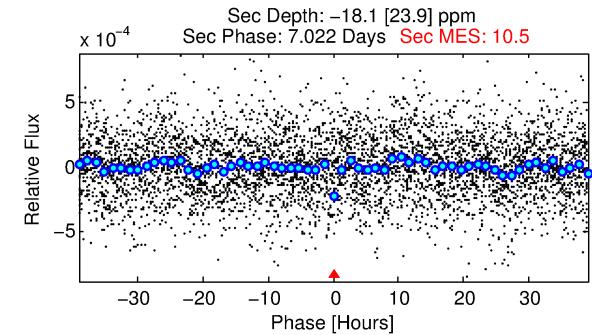
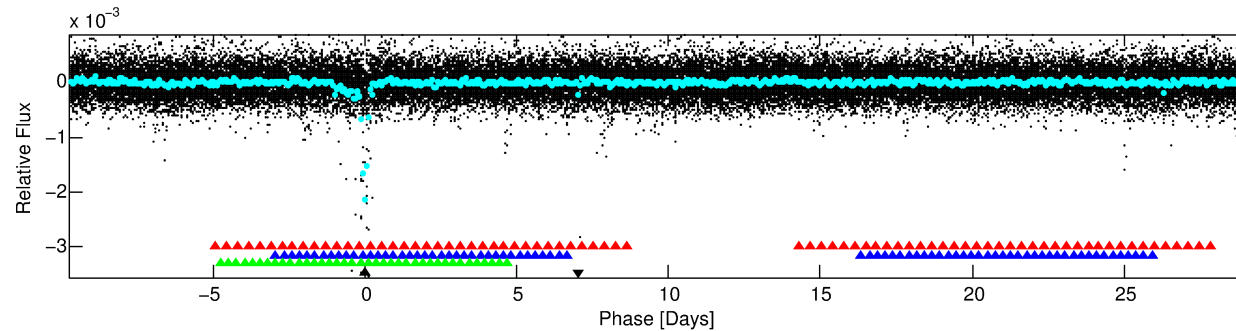
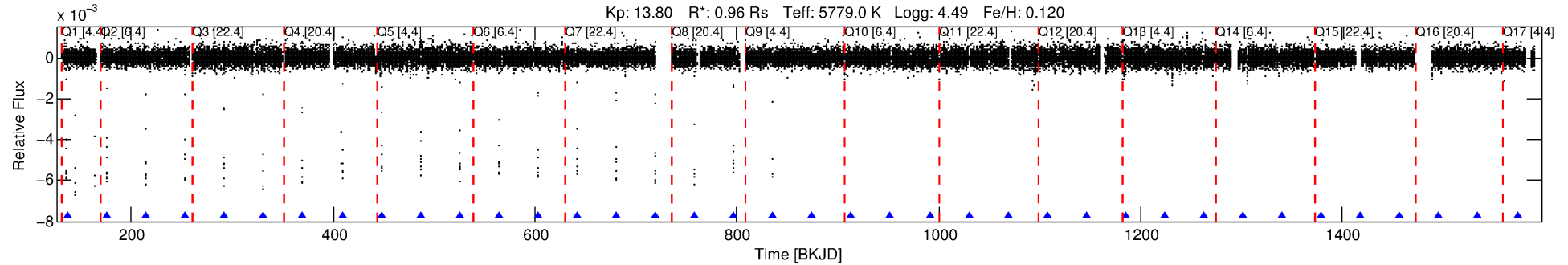
## Ephemeris Match Information For 003323887-04

No Significant Match Found



# DV One-Page Summary

KIC: 3323887 Candidate: 4 of 4 Period: 38.811 d  
KOI: K00377 Name: Kepler-9 Corr: No Ephemeris Match



## TPS TCE Results:

Period = 38.81086 d  
Epoch = 137.2392 BKJD

DV fit results are unavailable

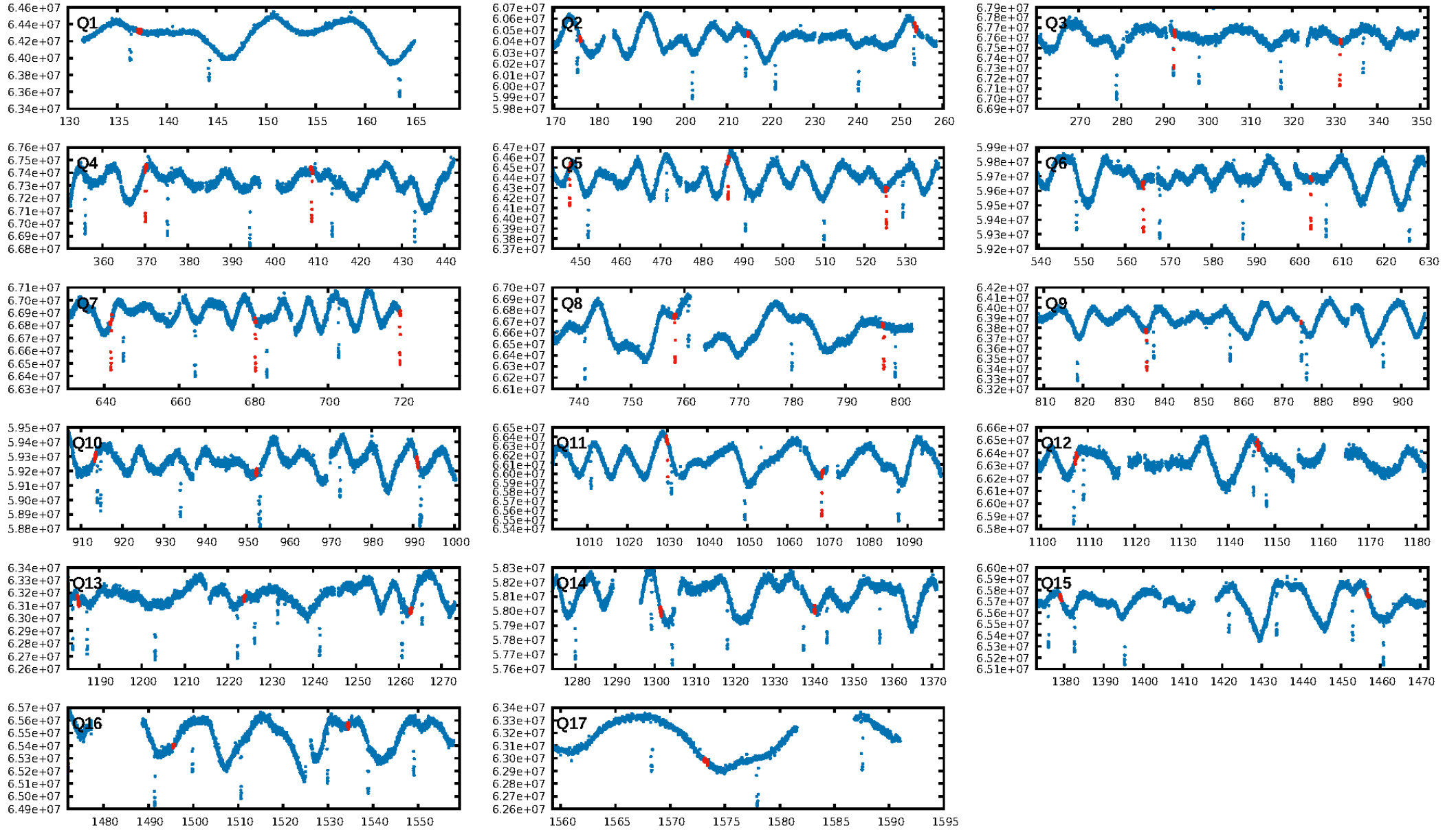
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [67.10 $\sigma$ ]  
LongPeriod-sig: 62.4% [0.89 $\sigma$ ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [31/31]  
**GhostDiagnostic-chr:  $-0.0911$**   
Centroid-sig: 10.4%  
**Centroid-so: 0.374 arcsec [4.44 $\sigma$ ]**  
OotOffset-rm: 0.076 arcsec [0.08 $\sigma$ ]  
KicOffset-rm: 0.101 arcsec [0.11 $\sigma$ ]  
OotOffset-st: 3/3/4/3 [13]  
KicOffset-st: 3/3/4/3 [13]  
DiffImageQuality-fgm: 0.54 [7/13]  
DiffImageOverlap-fno: 0.76 [13/17]

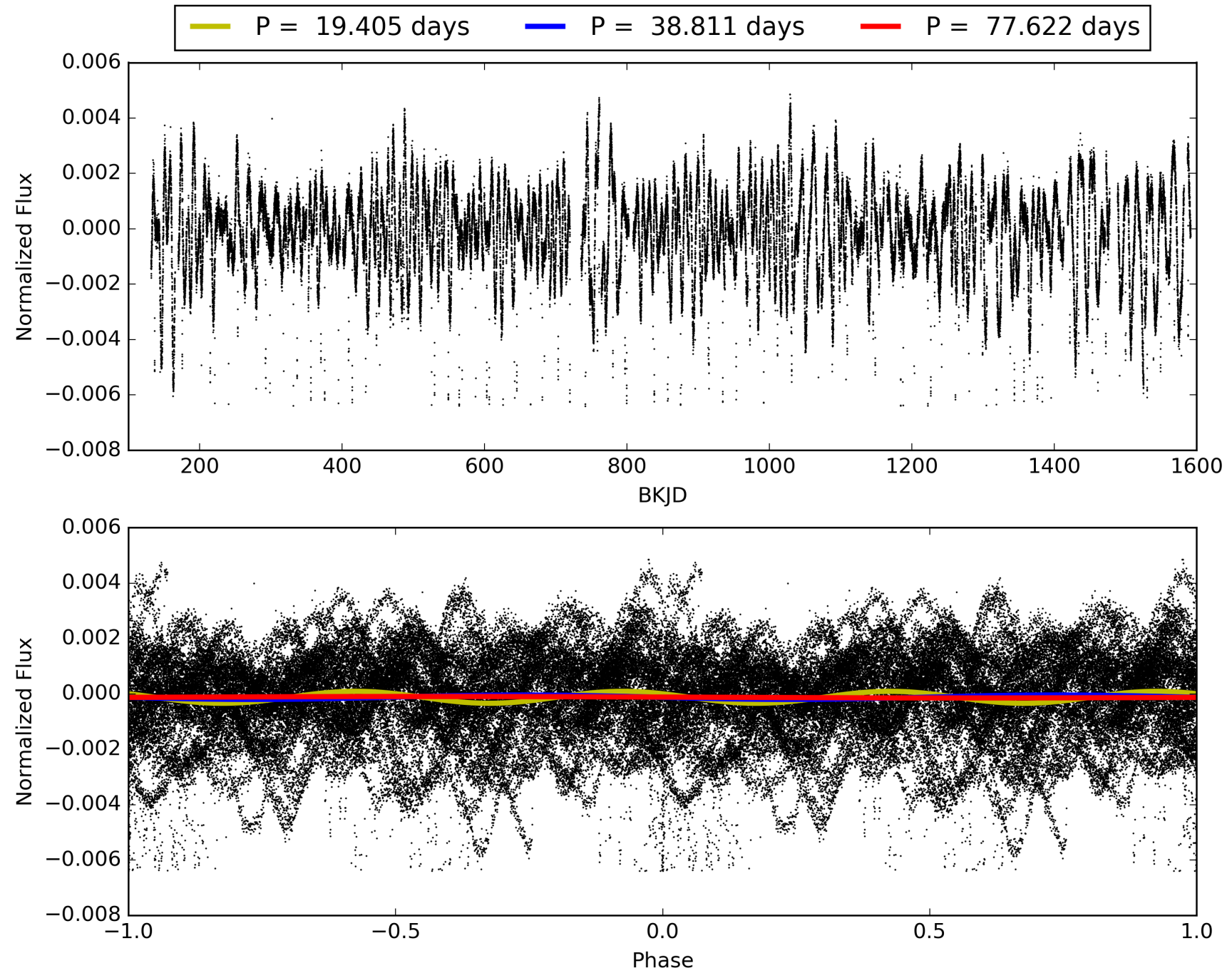
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 02-Feb-2016 07:24:24 Z

This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 00323887-04, PDC Light Curves

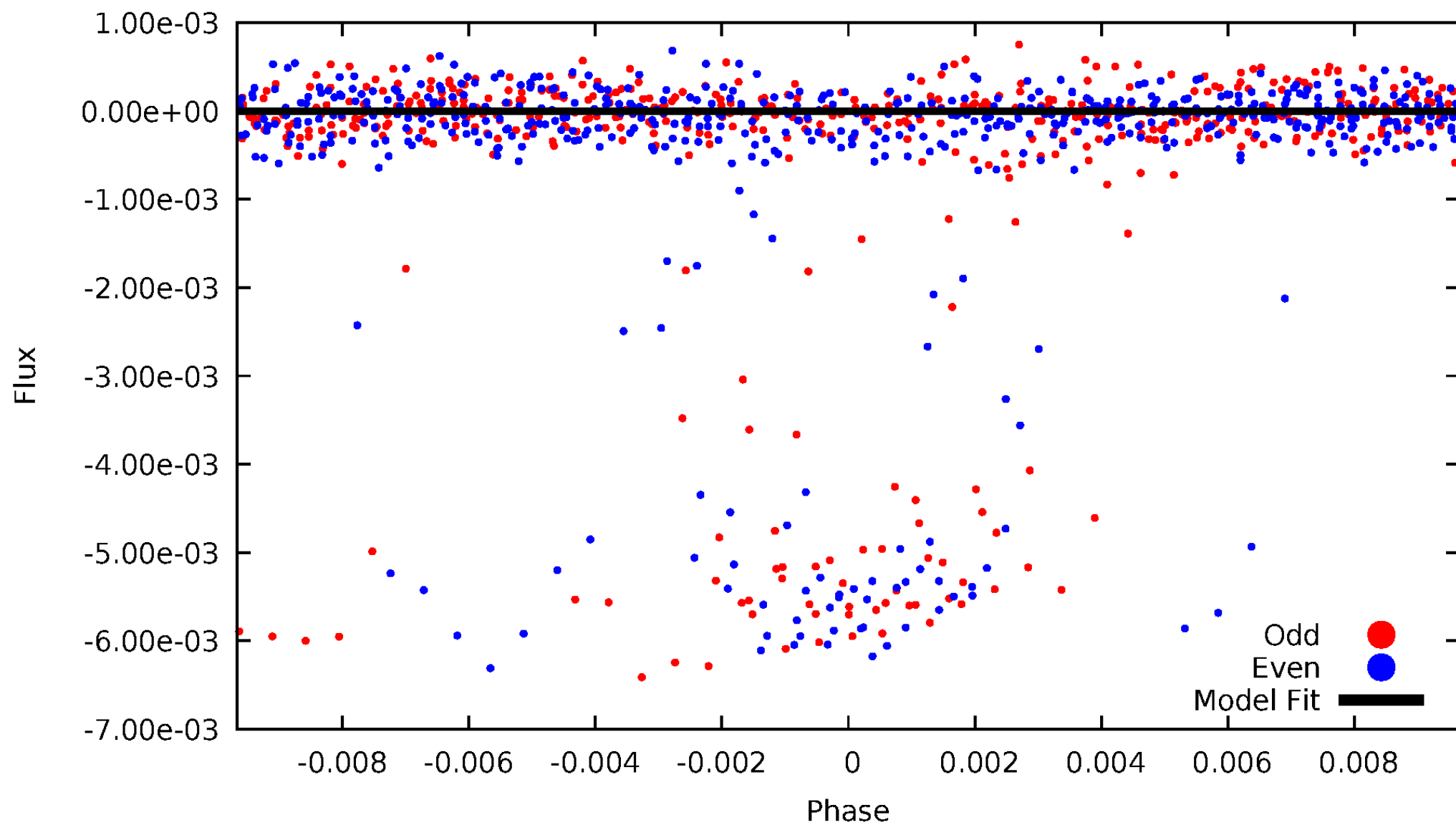


TCE 003323887-04



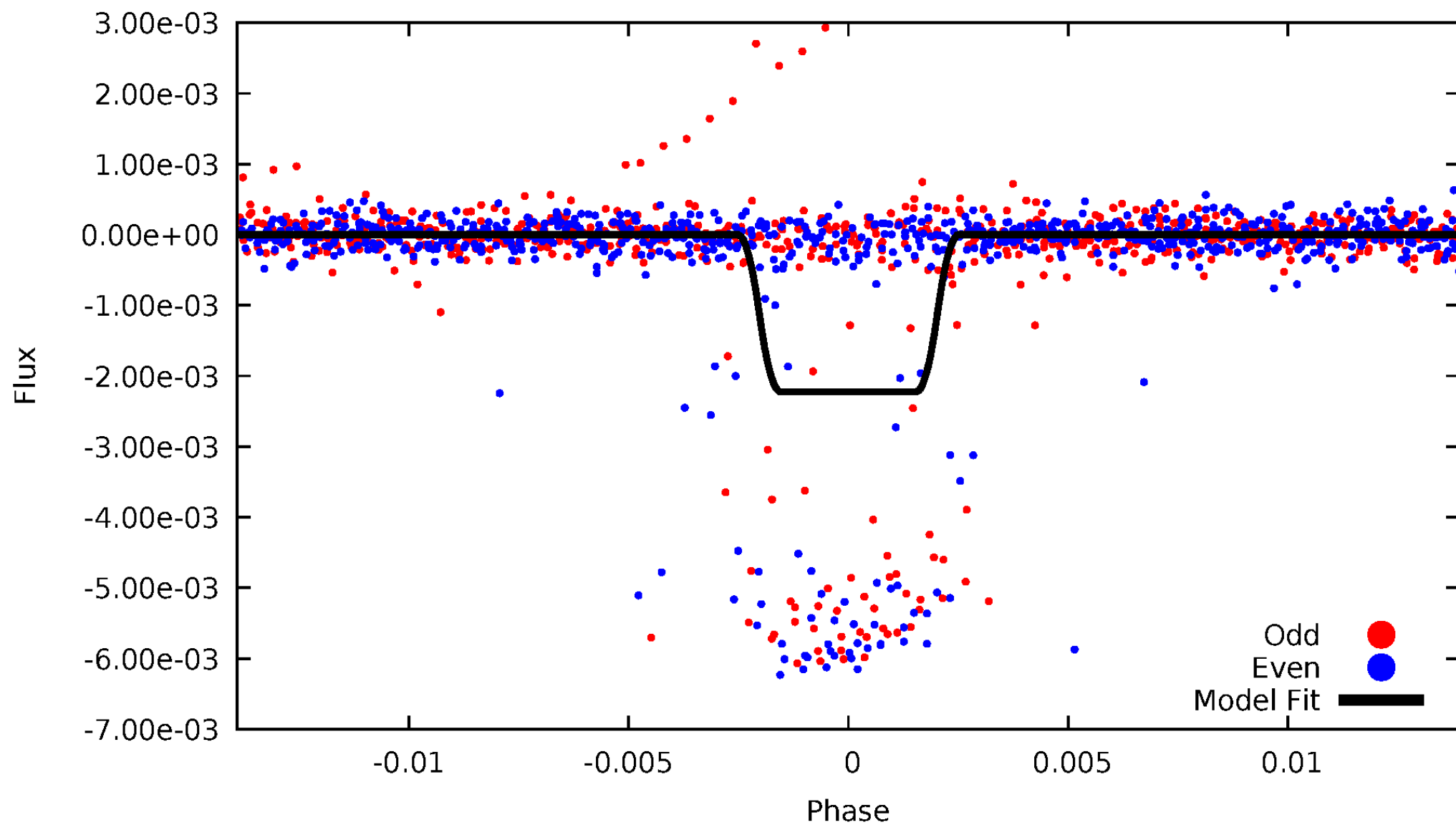
# DV Odd/Even

TCE 003323887-04



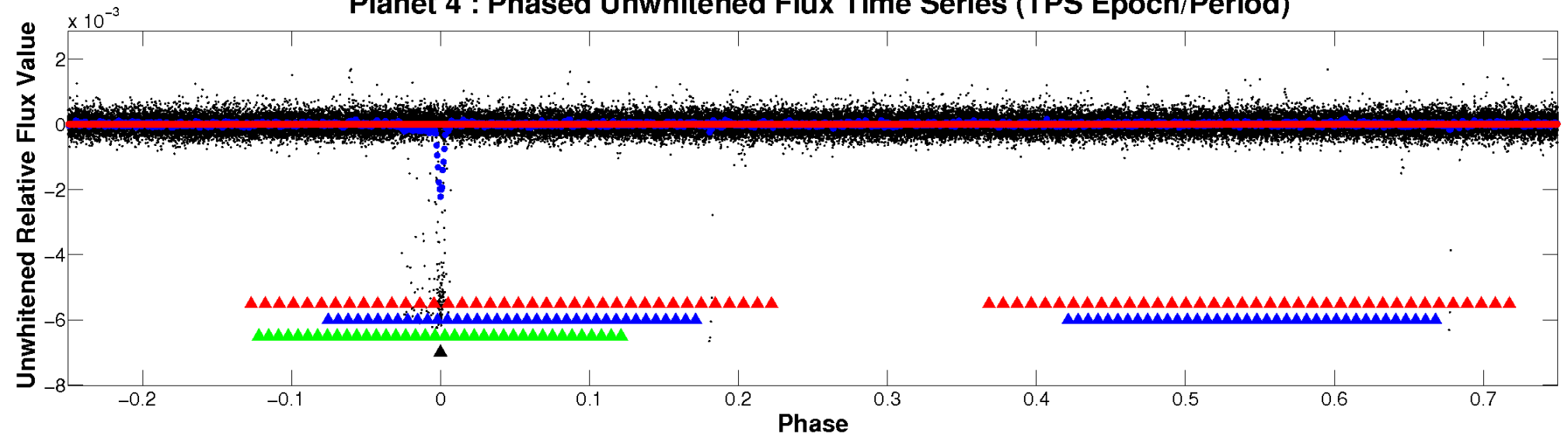
# ALT Odd/Even

TCE 003323887-04

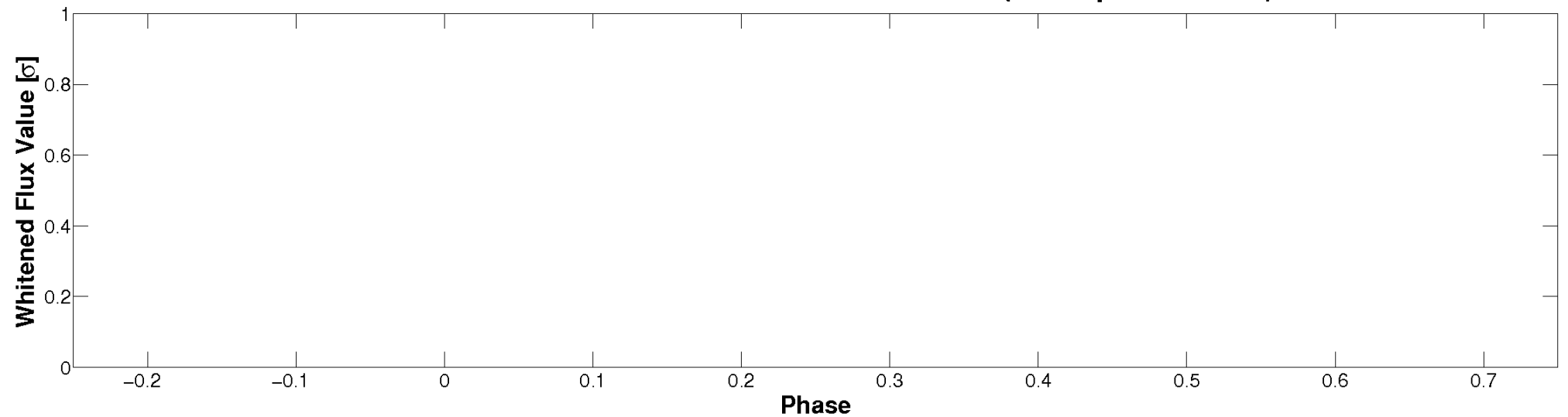


# Non-Whitened Vs. Whitened Light Curve

**Planet 4 : Phased Unwhitened Flux Time Series (TPS Epoch/Period)**

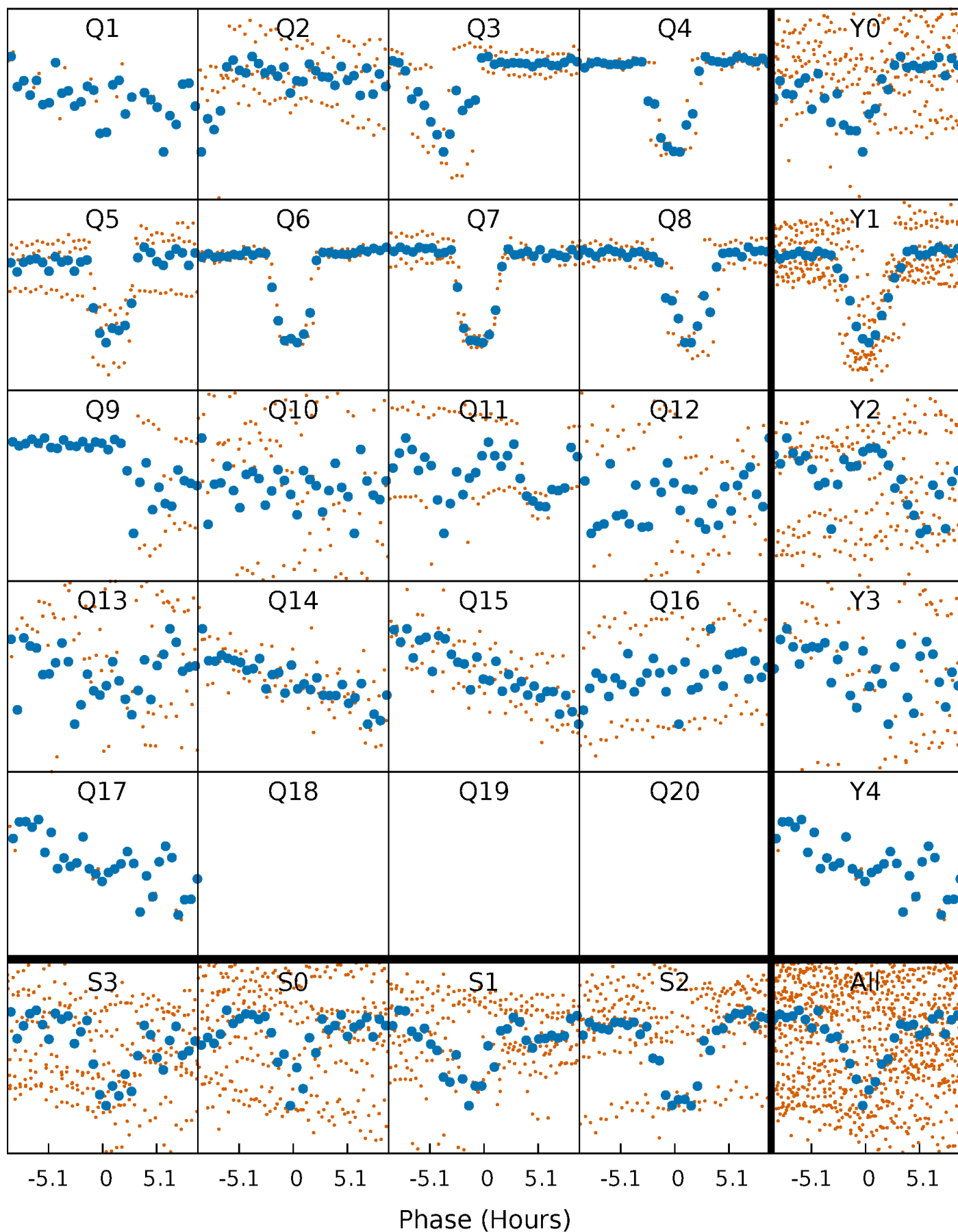


**Planet 4 : Phased Whitened Flux Time Series (TPS Epoch/Period)**



# PDC Quarter-Phased Transit Curves

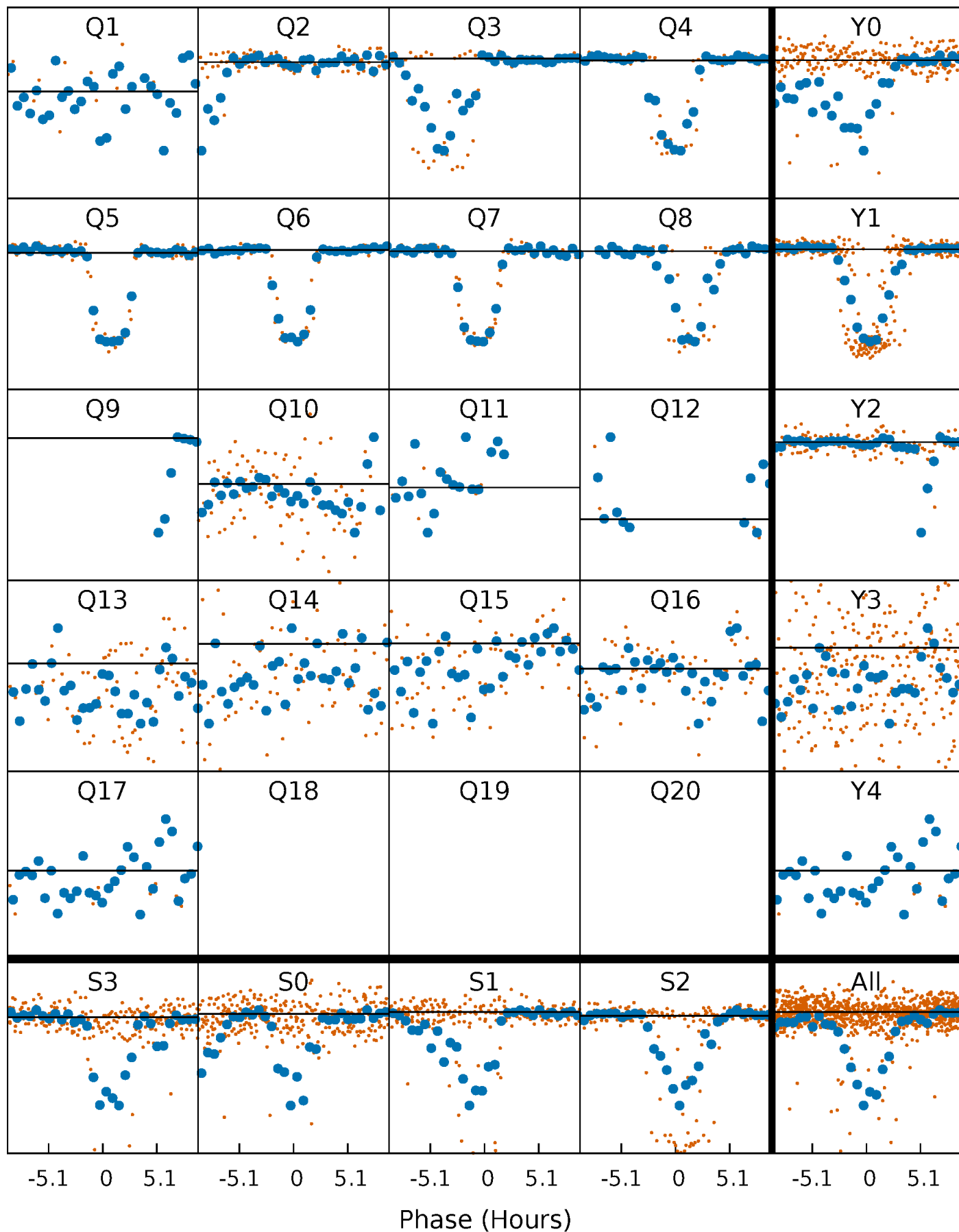
TCE 003323887-04 P= 38.810860 Days  $T_0=137.239202$  (BKJD)





# DV Quarter-Phased Transit Curves

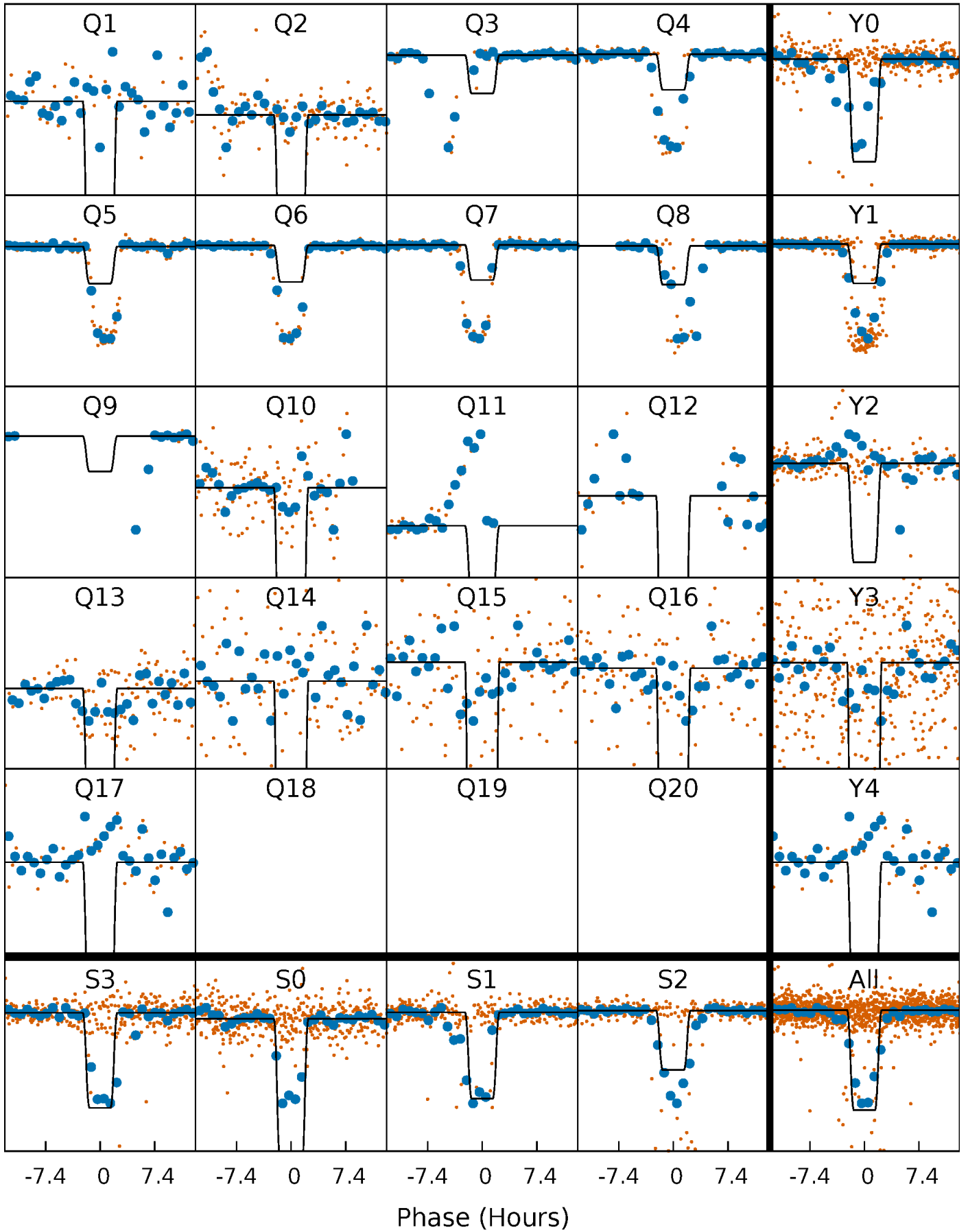
TCE 003323887-04 P= 38.810860 Days  $T_0=137.239202$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

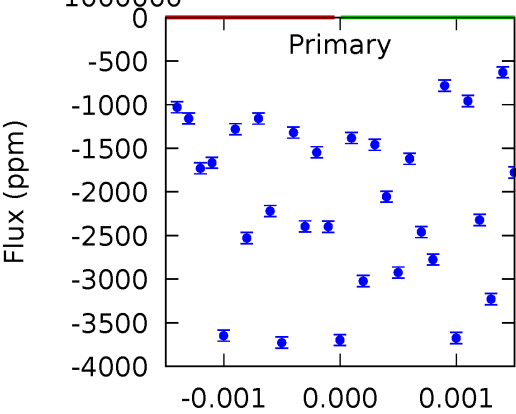
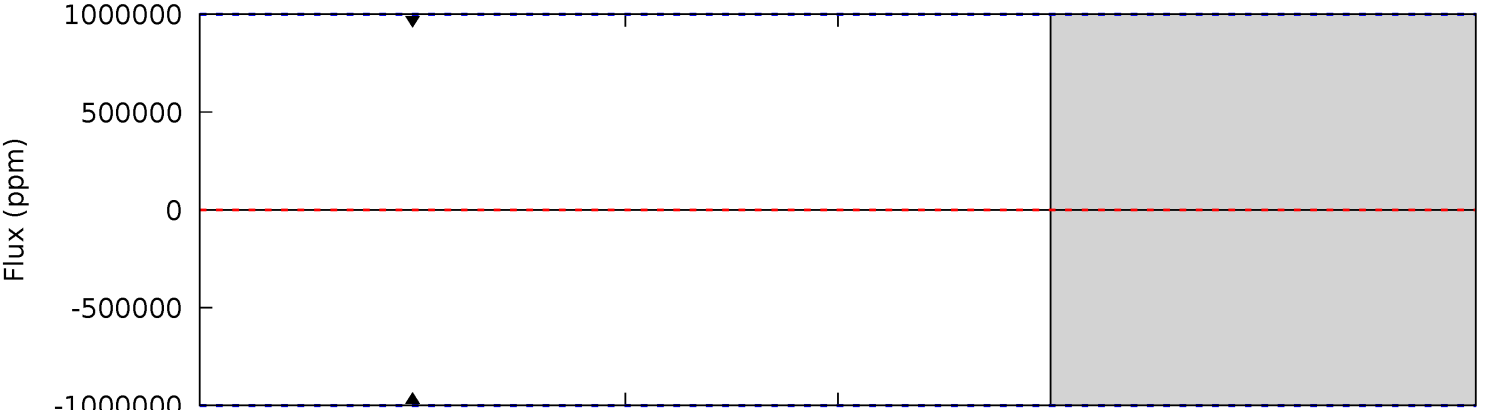
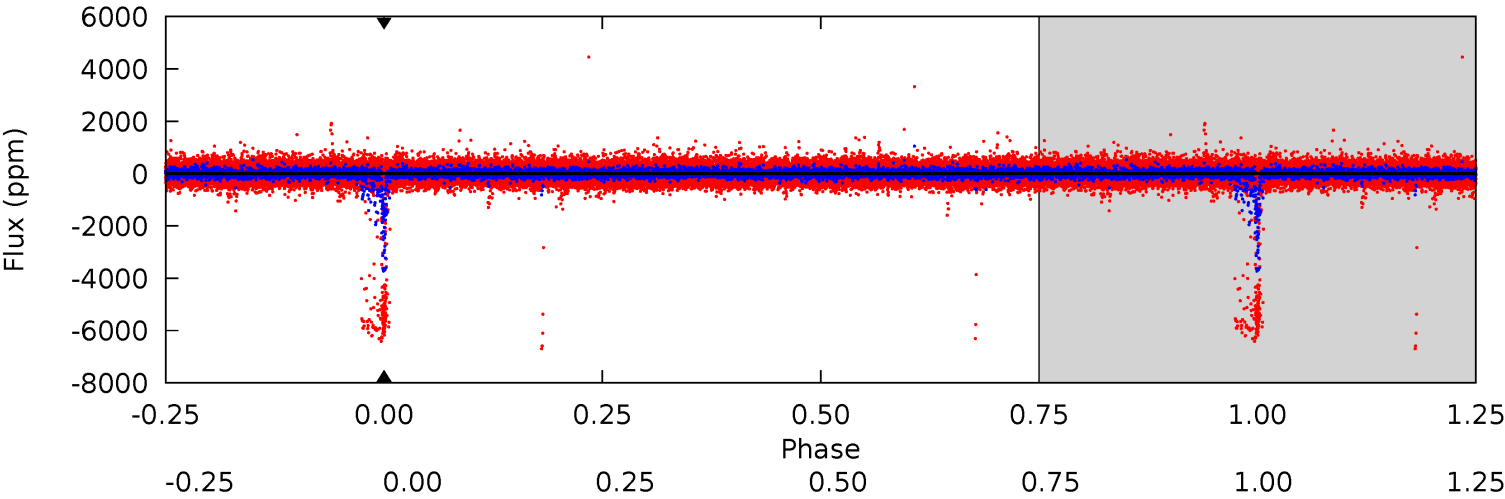
TCE 003323887-04 P= 38.810860 Days  $T_0=137.245880$  (BKJD)



# DV Model-Shift Uniqueness Test

003323887-04, P = 38.810860 Days, E = 98.428342 Days

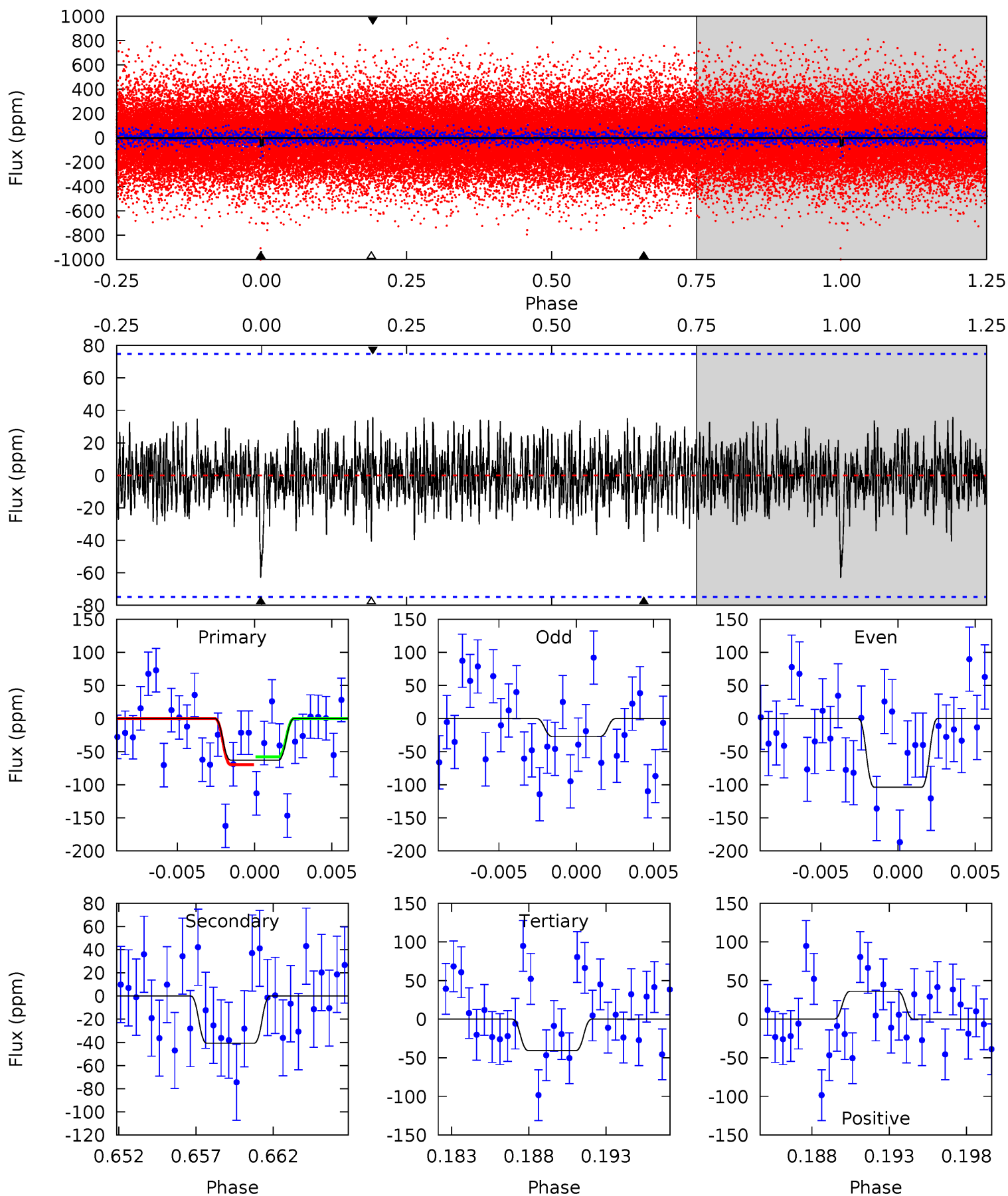
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
0	0	0	0	1.00	1.00	1.00	0	0	0	0	0	0	0	0



# Alt Model-Shift Uniqueness Test

003323887-04, P = 38.810860 Days, E = 98.435020 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
4.34	2.81	2.81	2.49	5.16	2.81	0.89	1.54	1.86	0.01	0.33	2.58	8.79	0.36	0.41



### Stellar Parameters For KIC 003323887

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (g \cdot \text{cm}^{-3})$
	$5779^{+104}_{-127}$	$4.491^{+0.030}_{-0.128}$	$0.120^{+0.150}_{-0.150}$	$0.956^{+0.147}_{-0.053}$	$1.034^{+0.058}_{-0.080}$	$1.665^{+0.245}_{-0.561}$
	+2%/-2%	+1%/-3%	+125%/-125%	+15%/-6%	+6%/-8%	+15%/-34%
Source	SPE24	SPE24	SPE24	DSEP		

KIC = Kepler Input Catalog; PHO = Photometry; SPE = Spectroscopy; AST = Asteroseismology  
 TRA = Transits; DESP = Dartmouth Models; MULT = Multiple Models

### Secondary Eclipse Parameters for KIC 003323887-04 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$0 \pm 1000000$	$10.19^{+8.42}_{-6.51}$	$742^{+29}_{-23}$	$-4568^{+20508}_{-9265}$	$-813.363^{+44831.721}_{-35759.587}$
Alt.	$-41 \pm 15$	$9.59^{+8.38}_{-6.79}$	$742^{+30}_{-23}$	$2395^{+941}_{-323}$	$12^{+117}_{-8}$

$T_{max}$  = Theoretical Maximum Planetary Temperature

$T_{obs}$  = Observed Planetary Temperature (Assuming A=0.3)

$A_{obs}$  = Observed Albedo (Assuming T=0)

If a secondary eclipse is present, the system is likely an EB if  $T_{obs} \gg T_{max}$  AND  $A_{obs} \gg 1.0$

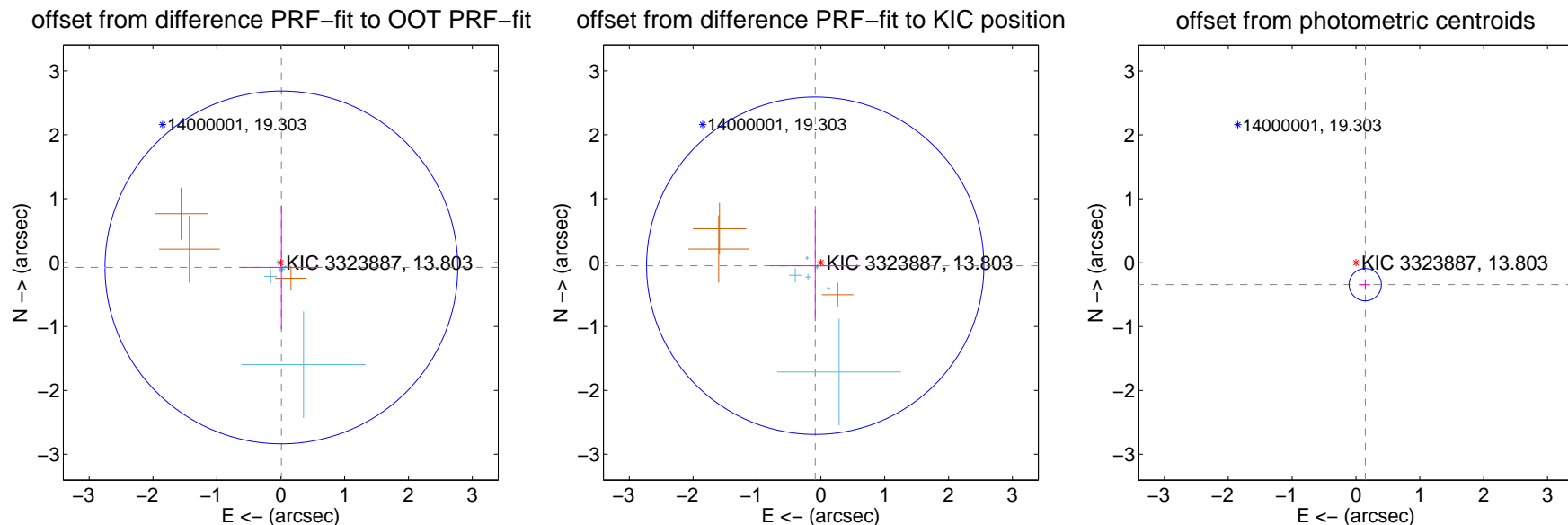
## DV Centroid Data

Supplemental centroid analysis for 003323887-04. Kepler magnitude: 13.80. Transit SNR -1.00

There are 7 quarters with good PRF difference image offsets

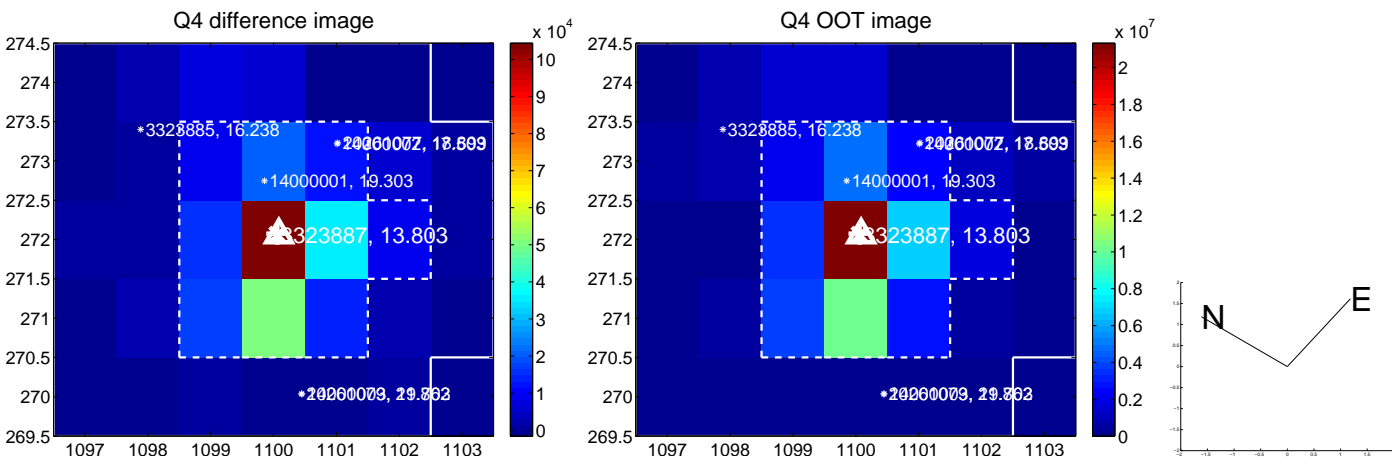
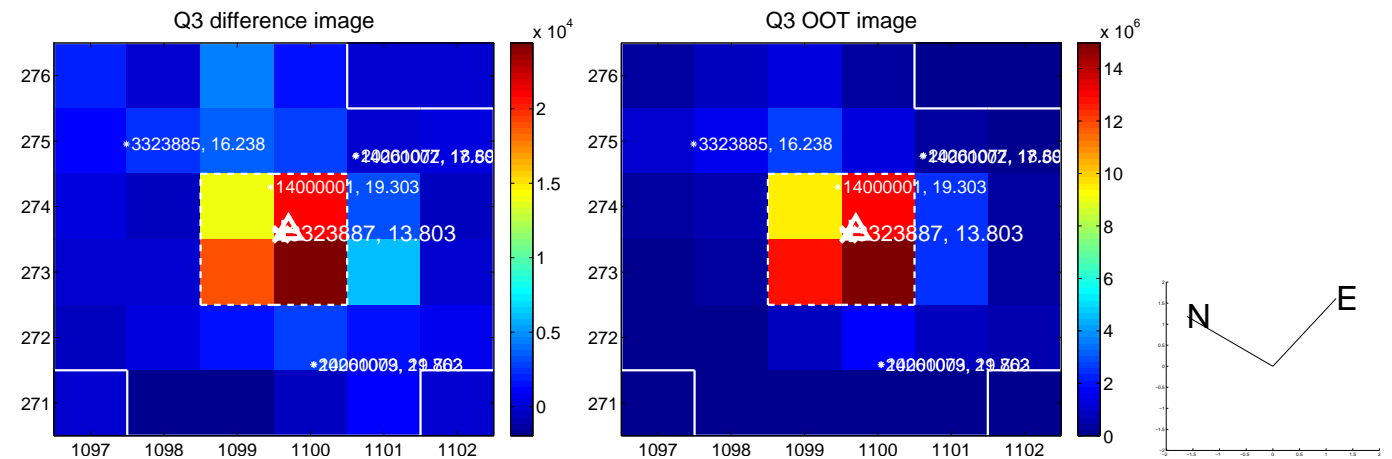
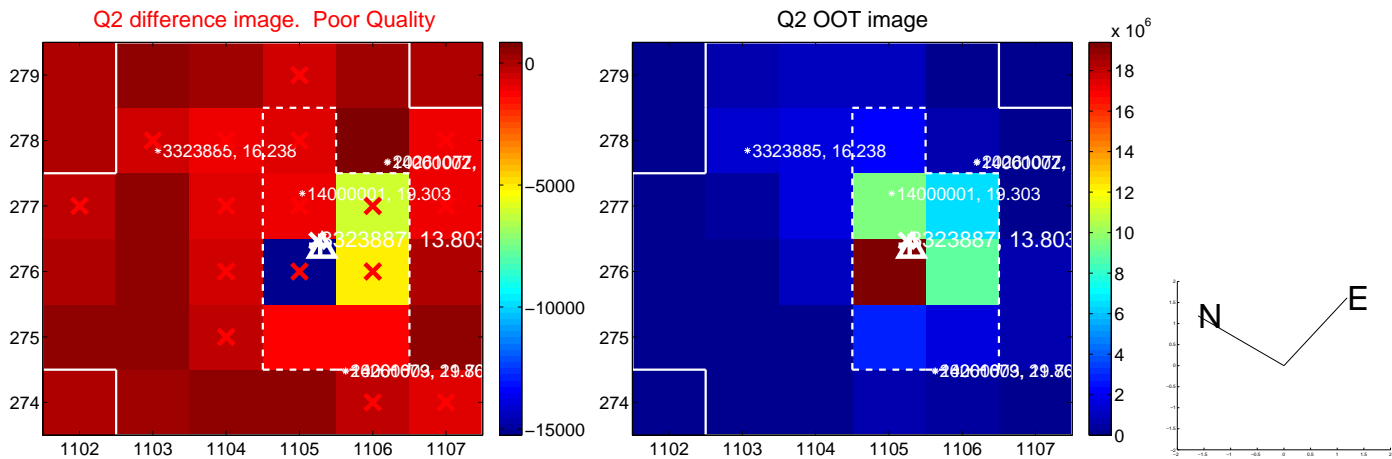
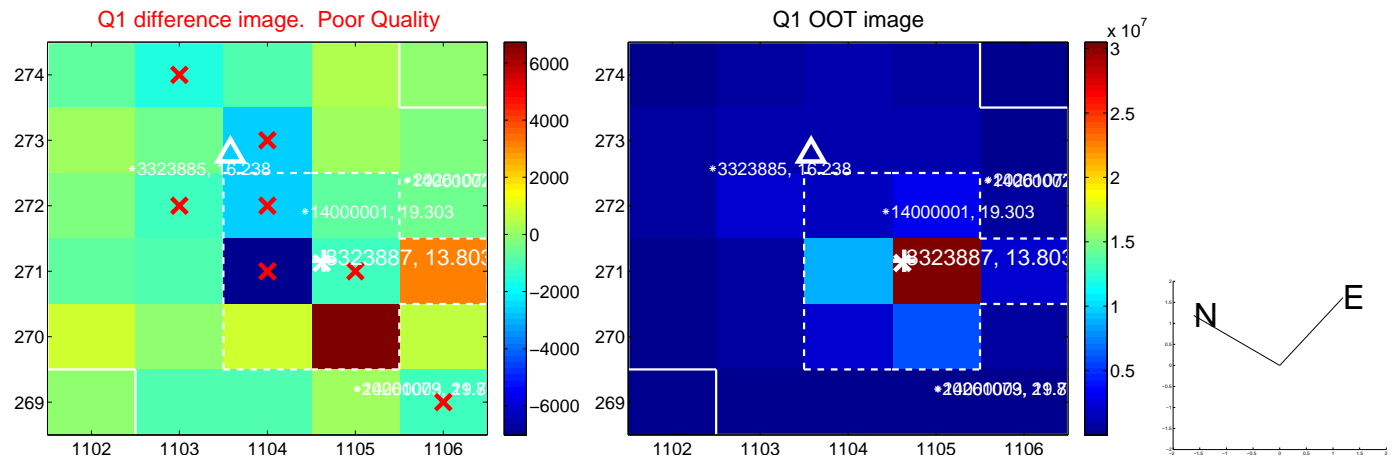
The direct PRF centroid is offset from the target star catalog position by about 0.07 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.076 \pm 0.920$	0.08	$-0.010 \pm 0.640$	$-0.075 \pm 0.968$
PRF-fit source offset from KIC position	$0.101 \pm 0.880$	0.11	$0.088 \pm 0.695$	$-0.049 \pm 0.868$
photometric centroid source offset	$0.37 \pm 0.08$	4.44	$-0.15 \pm 0.08$	$-0.34 \pm 0.09$

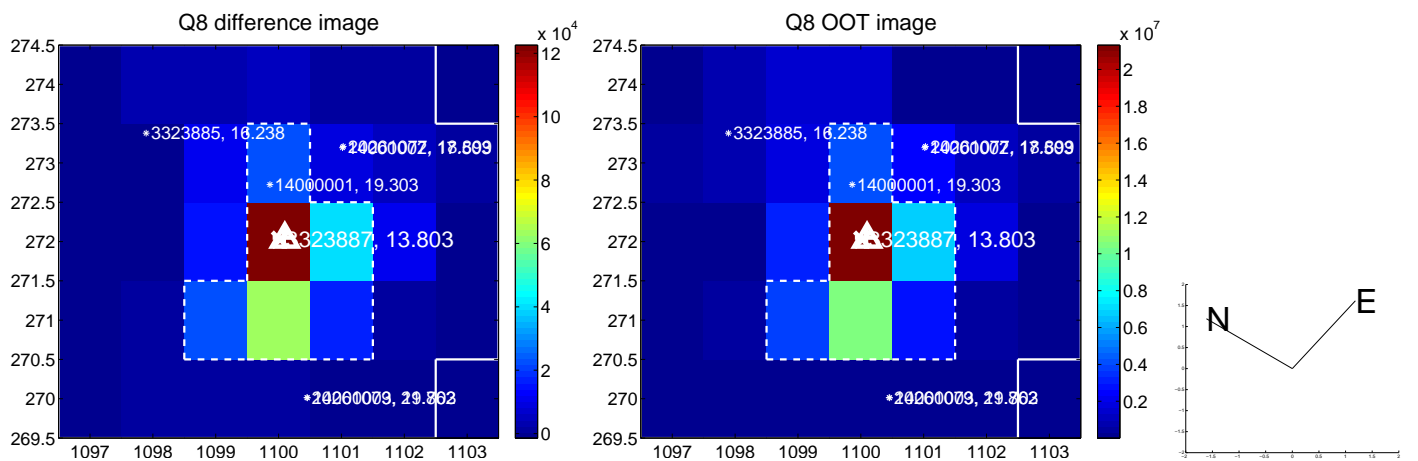
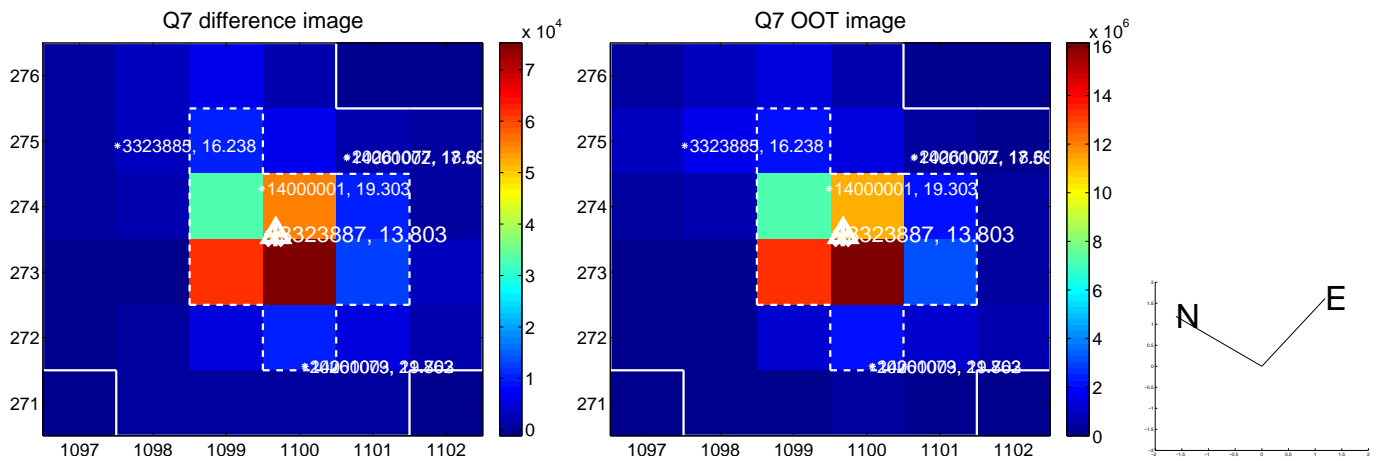
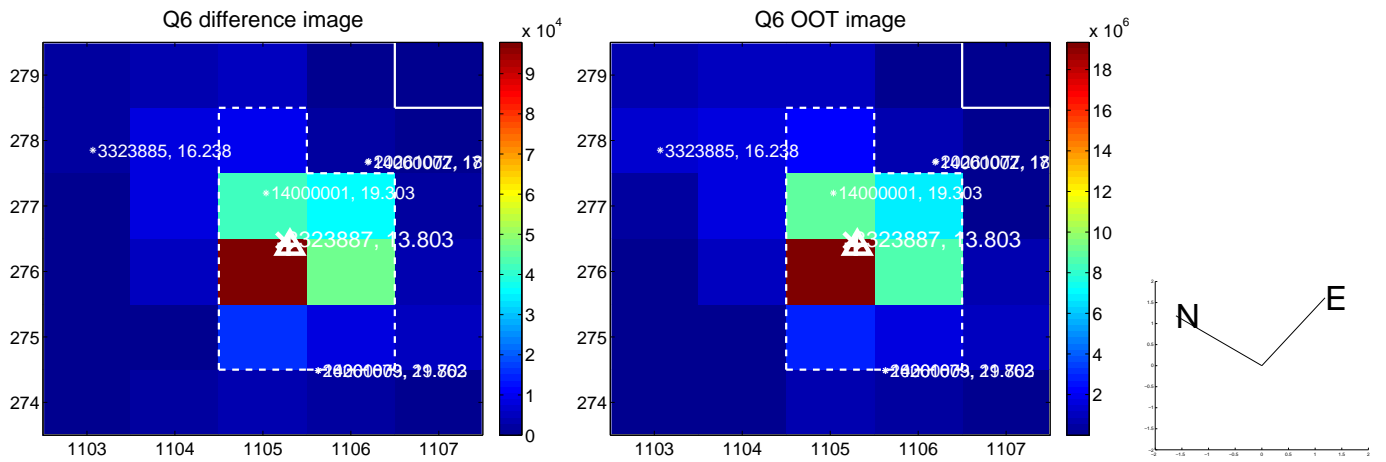
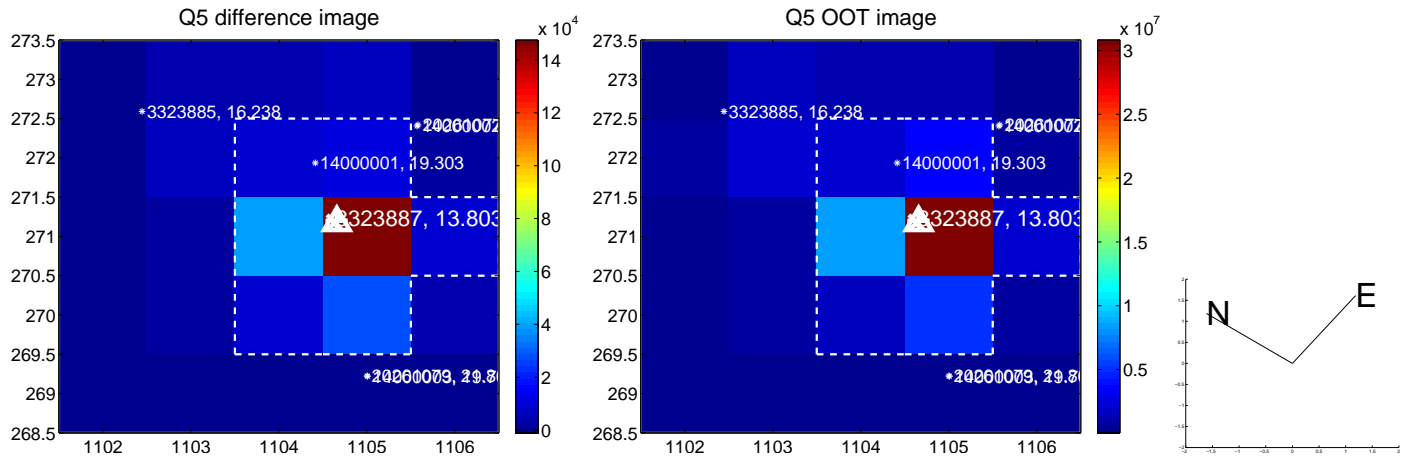


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three- $\sigma$ . Red \*: target star. Blue \*: Other stars. Text next to a star gives its KIC ID and kepmag. KIC IDs > 15,000,000 are from the UKIRT catalog.

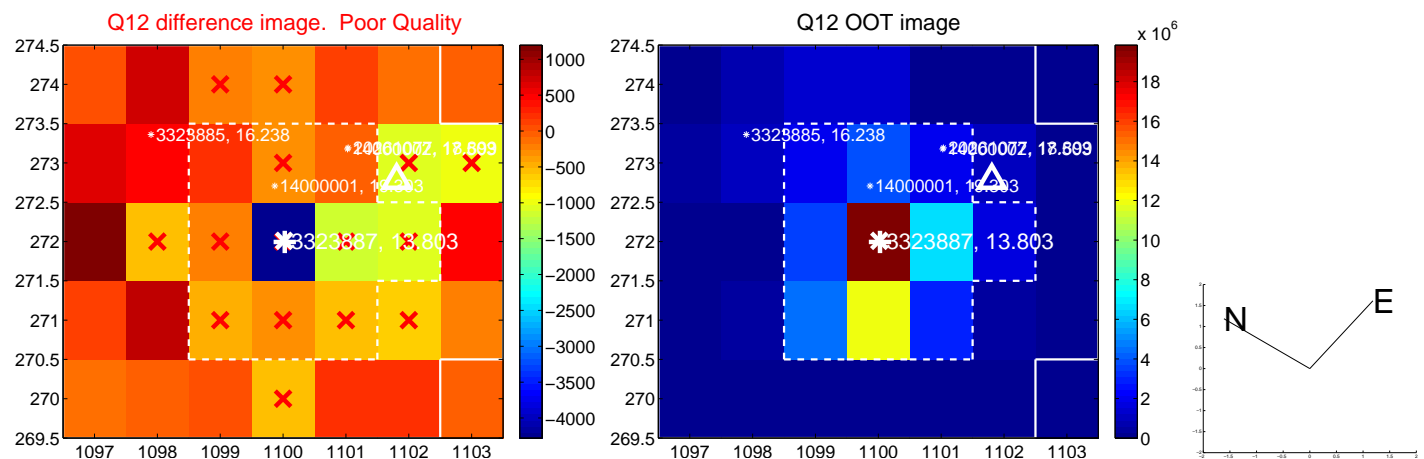
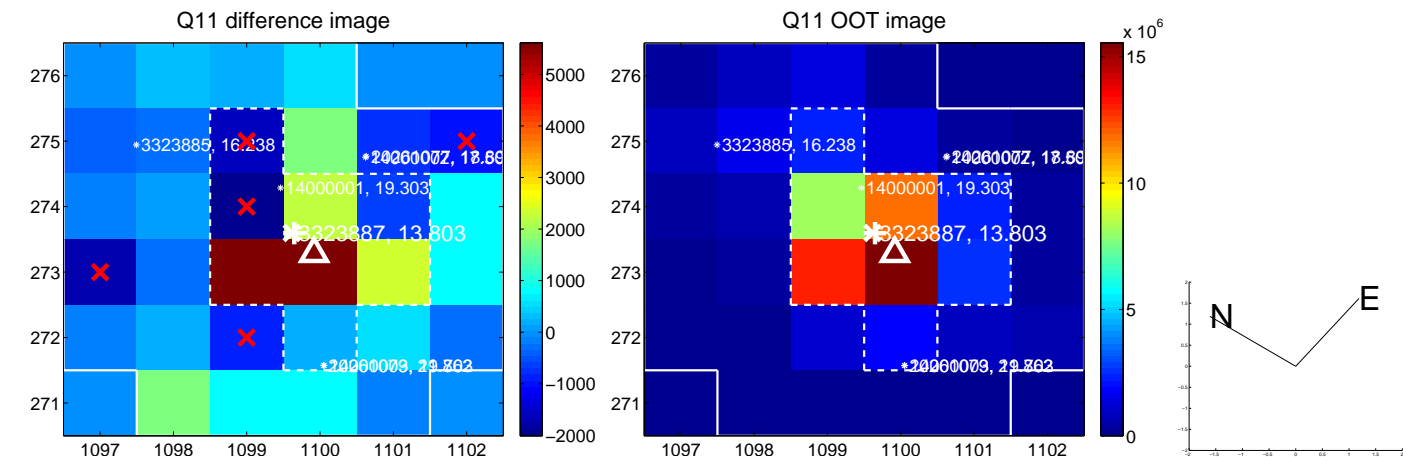
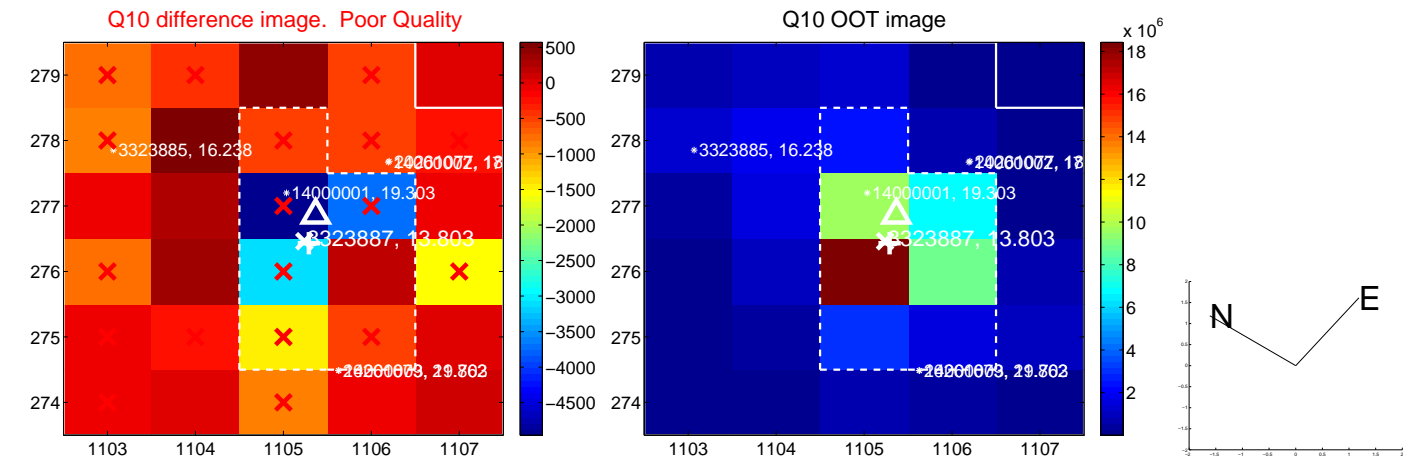
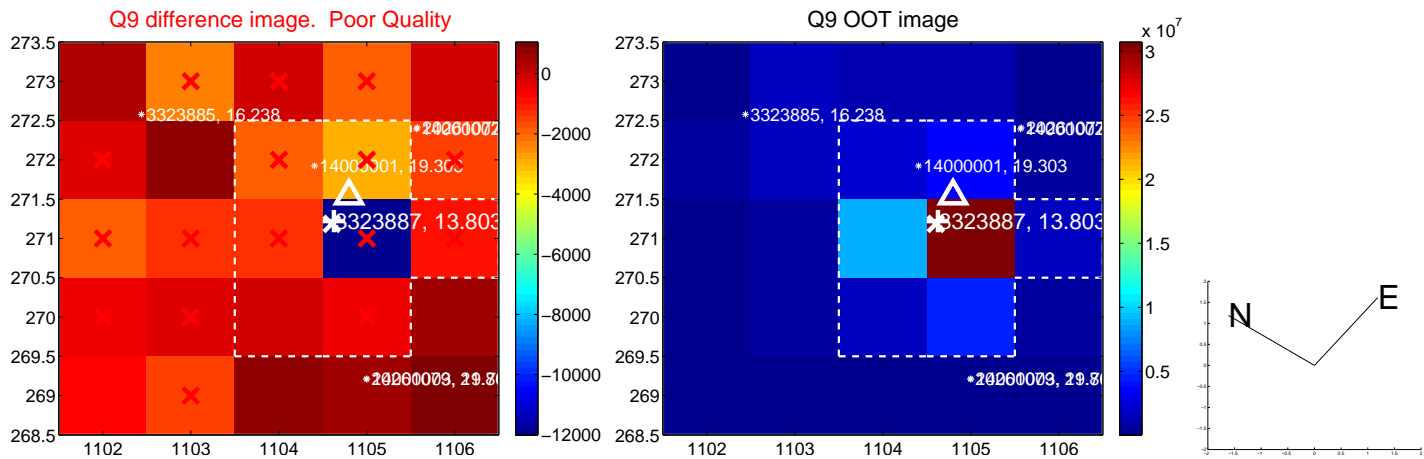
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

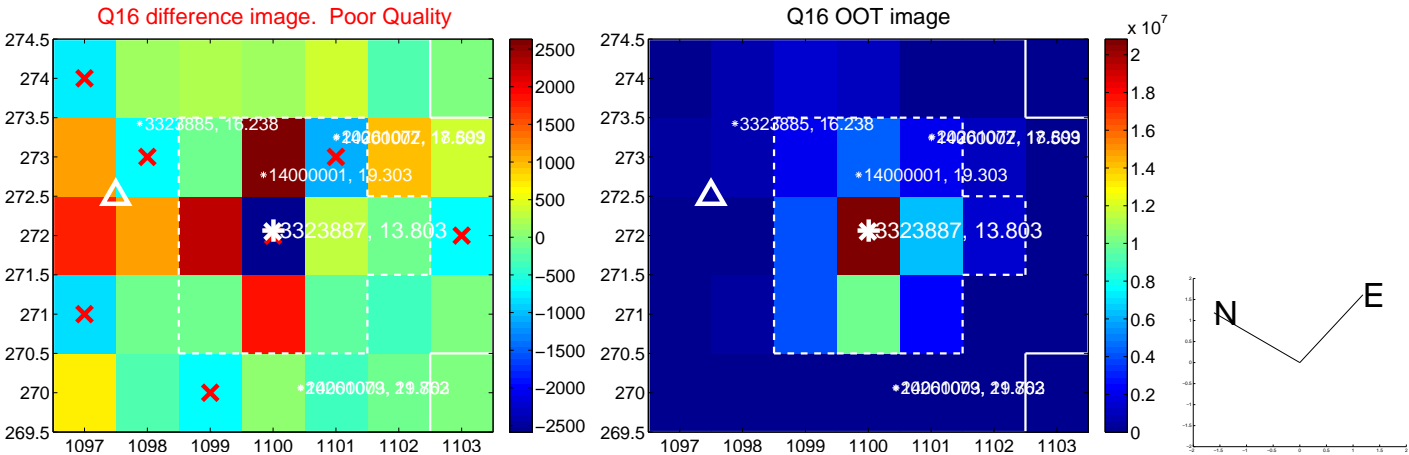
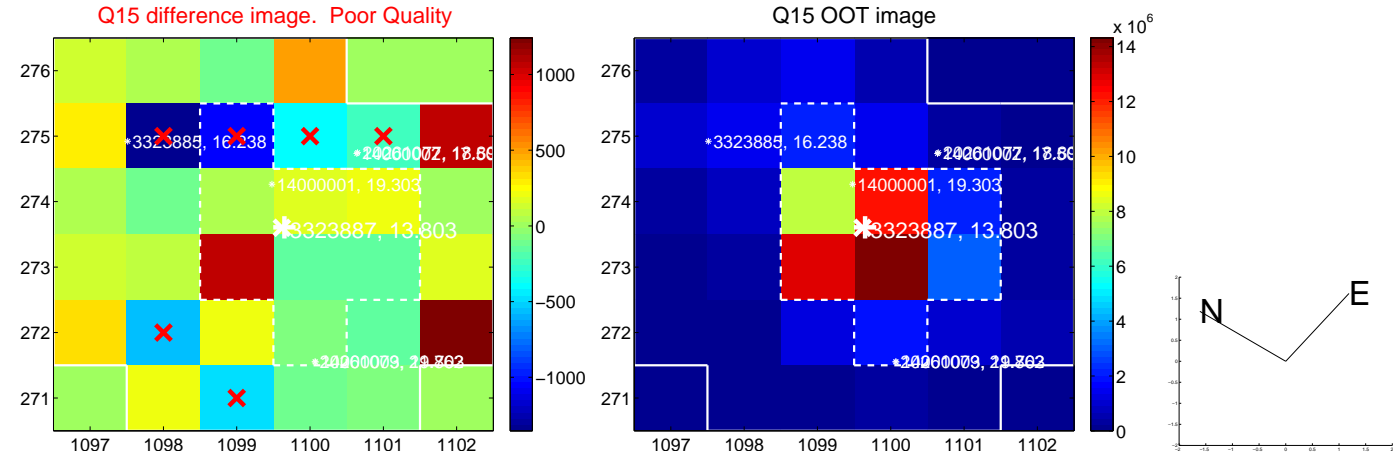
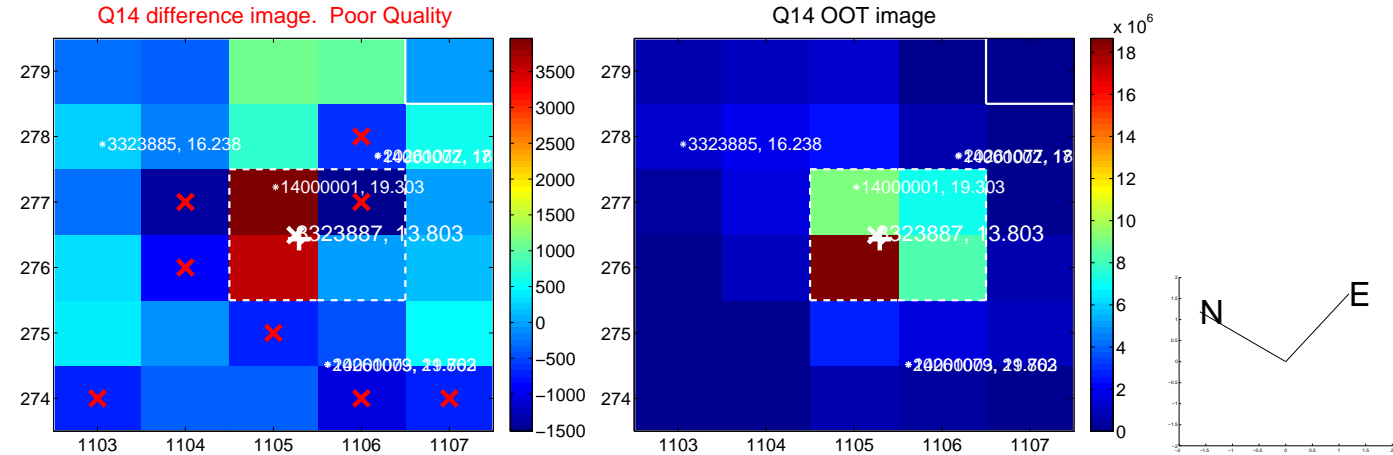
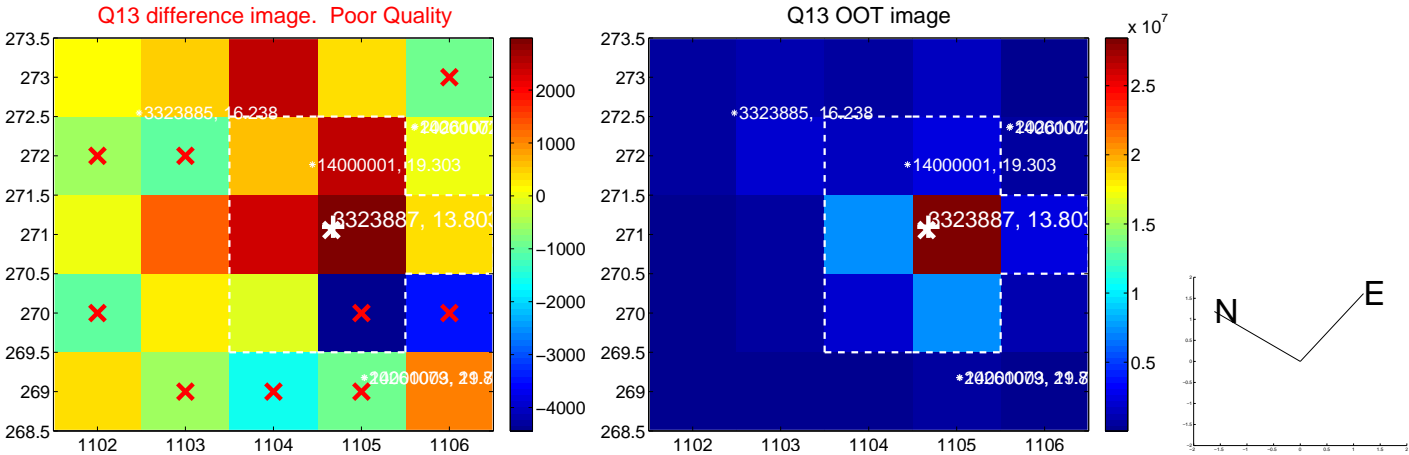


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

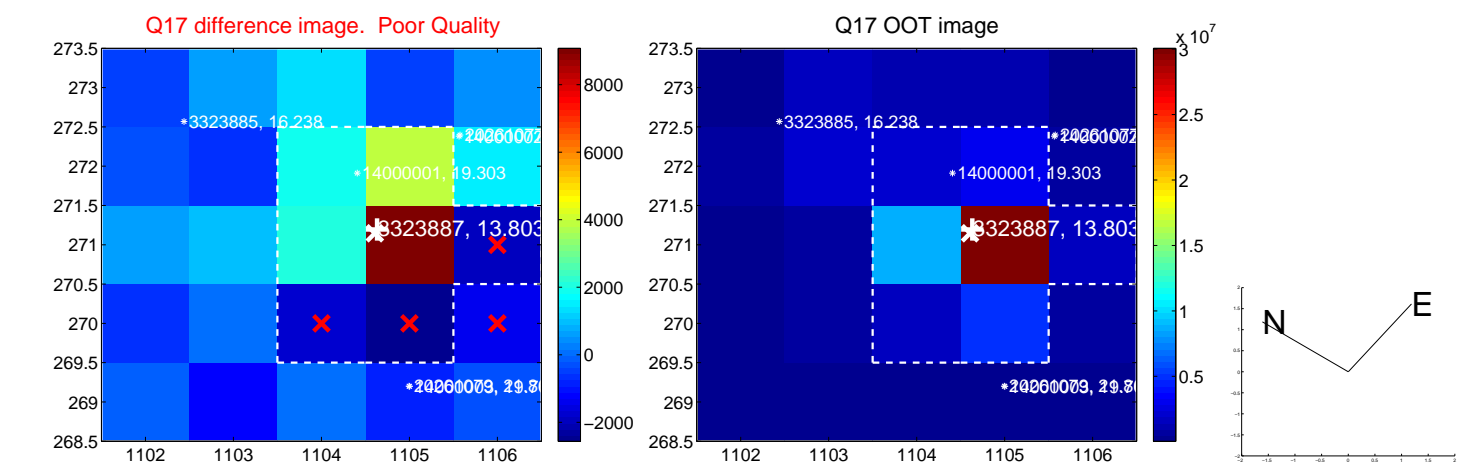




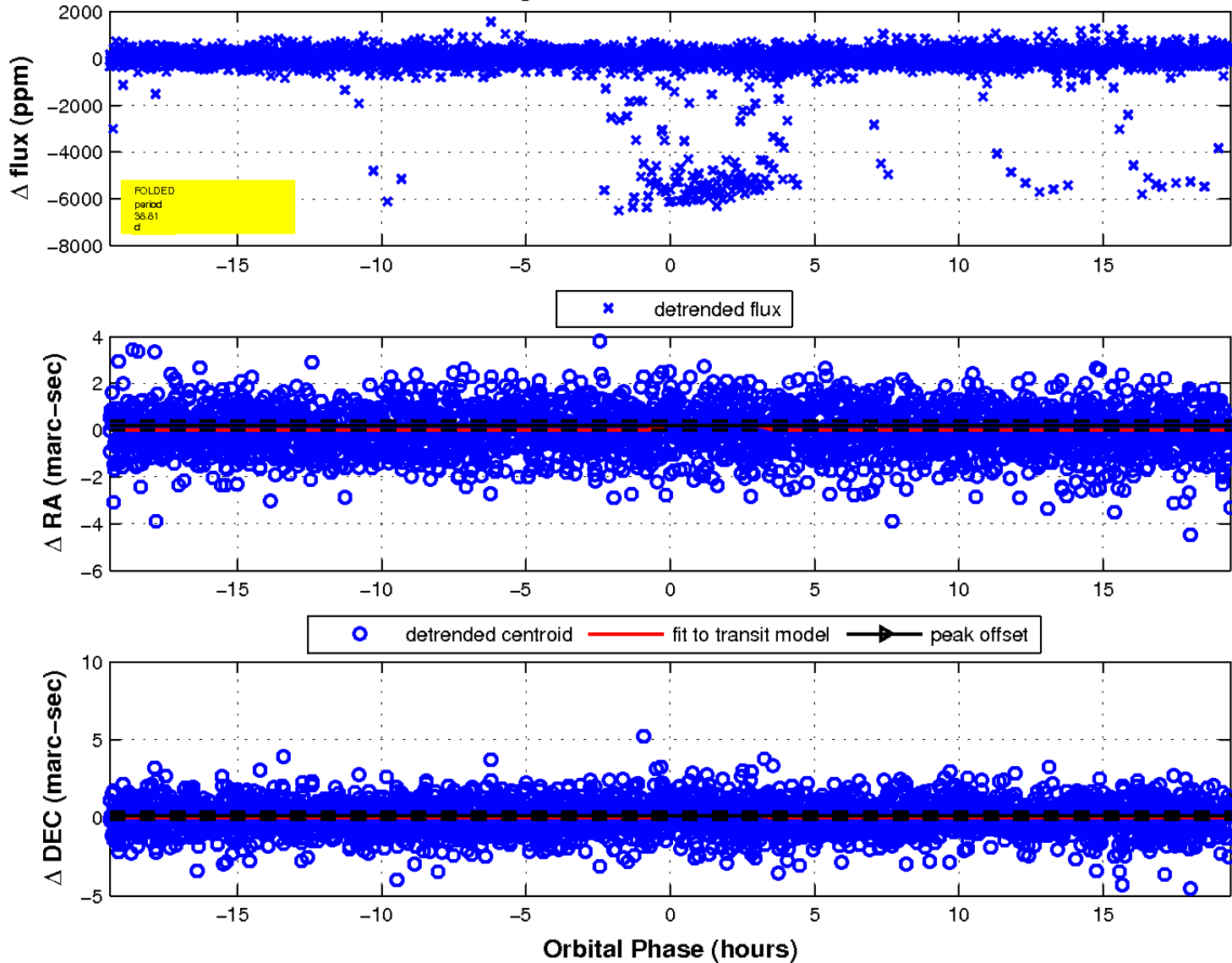
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



fluxWeightedCentroids, Planet 4 of 4



UKIRT Image

